May, 1948

EDISON ELECTRIC INSTITUTE BULLETIN

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GEOGRAPHY, RESOURCES & INDUSTRIES

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ELECTRICAL RESEARCH STATISTICS
THE ELECTRIC LIGHT AND POWER INDUSTRY

Current Statistical Data Covering 100 Per Cent of Industry

February, 1947-1948

SOURCE AND DISPOSAL OF ENERGY - MONTH OF FEBRUARY

GENERATION* (Net)	1948	1947	%
By Fuel Burning Plants	15,820,651,000	13,260,698,000	+19.3
By Water Power Plants	6,373,069,000	6,354,855,000	+ 0.3
TOTAL GENERATION	22,193,720,000	19,615,553,000	+13.1
Add — Net Imports Over International Boundaries	87,100,000	95,367,000	- 8.7
Less - Company Use	137,053,000	148,854,000	- 7.9
Less - Energy Used by Producer	255,779,000	324,536,000	
NET ENERGY FOR DISTRIBUTION	21,887,988,000	19,237,530,000	+13.8
Losses and Unaccounted for	1,984,460,000	1,454,268,000	+36.5
SALES TO ULTIMATE CUSTOMERS	19,903,528,000	17,783,262,000	+11.9

CLASSIFICATION OF SALES

NUMBER OF CUSTOMERS - As of February 29th			
Residential or Domestic	31,887,446	29,990,661	+ 6.3
Rural (Distinct Rural Rates)	1,548,323	1,405,458	+10.2
Commercial or Industrial			
Small Light & Power	4,982,666	4,726,051)	
Large Light & Power	192,803	175,484)	+ 5.6
Other Customers	136,280	126,912	+ 7.4
TOTAL ULTIMATE CUSTOMERS	38,747,518	36,424,566	+ 6.4
KILOWATTHOUR SALES - During Month of February			
Residential or Domestic	4,633,168,000	3,959,621,000	+17.0
Rural (Distinct Rural Rates)	429,077,000	294,911,000	+45.5
Commercial or Industrial			
Small Light & Power	3,518,303,000	3,141,951,000	+12.0
Large Light & Power	9,897,353,000	8,987,780,000	+10.1
Street and Highway Lighting	219,166,000	203,519,000	+ 7.7
Other Public Authorities	534,350,000	506,368,000	+ 5.5
Railways and Railroads			
Street & Interurban Railways	386,709,000	416,927,000	- 7.2
Electrified Steam Railroads	226,065,000	225,933,000	+ 0.1
Interdepartmental	59,337,000	46,252,000	+28.3
TOTAL TO ULTIMATE CUSTOMERS	19,903,528,000	17,783,262,000	+11.9
REVENUES FROM ULTIMATE CUSTOMERS	$ 357,697,800	$ 320,173,600	+11.7

RESIDENTIAL OR DOMESTIC SERVICE

Average Customer Data - for 12 months ended February 29th			
Kilowatthours per Customer	1,465	1,349	+ 8.6
Average Annual Bill	$44.83	$42.90	+ 4.5
Revenue per Kilowatthour	3.06¢	3.18¢	- 3.8

(*) By Courtesy of the Federal Power Commission

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EDISON ELECTRIC INSTITUTE BULLETIN

Volume 16 MAY, 1948 No. 5

A. G. A.-E. E. I. Accountants Hold Largest, Most Informative Joint Conference in St. Louis

AT St. Louis on April 12, 13, and 14, the latest in the series of joint conferences of the electric and gas utility accountants now well established as the big event of the year for the accounting personnel of the two industries was held. The selection of St. Louis made possible a larger attendance than usual from the utilities in the south and west and the total registration of 671 was the largest so far on record for the series. All sessions were well attended, from the general session which opened the conference all the way through the small specialized project committee groups, and keen interest was displayed in the papers, reports, and discussions.

H. B. HARDWICK
Chairman, E.E.I. General Committee

The conference opened with a general session on Monday afternoon which was called to order by H. B. Hardwick, Consumers Power Company, chairman of the E.E.I. Accounting Division General Committee. John A. Williams of the Niagara Hudson Power Company shared with Mr. Hardwick the duties of presiding officer of the session, and the two divided the responsibility of introducing the speakers.

First on the general session program was an address of welcome to St. Louis by R. W. Otto, president of the Laclede Gas Light Company of that city. He stressed the importance of the accountant's function in providing management with facts and records essential to successful operation, but he also emphasized that accountants have another great responsibility for making the financial facts and results of utility operation clear to the public whom we serve.

The timely and highly significant subject of "Utility Financing in Tomorrow's Money Market" was presented by Edward Hopkinson, Jr., senior partner of Drexel & Company, Philadelphia and a member of President Truman's Committee on The Conduct and Financing of United States Foreign Trade. Mr. Hopkinson expressed optimism about the immediate future trend of business activities and confidence that the Treasury and Federal Reserve Board would proceed with a cautious and moderate policy of deflation. He thought that the principal difficulties in equity financing by utilities were due to economically unsound tax laws, and urged united effort to secure sounder tax legislation. He expressed emphatic opposition to sinking fund provisions in preferred stock indentures, sometimes insisted upon by institutional investors.

In a report ably presented by J. E. King, Consolidated Edison Company of New York, Inc., co-chairman of the Committee on Employee Relations, the subject of "Employee Performance Rating for Accounting Department and Other Office Employees" was thoroughly discussed. The committee believes that formal rating plans can be a most useful tool of management but they point out, however, that no rating plan will successfully attain its objectives unless it is carefully developed with reference to the particular organization where it is to be installed and has the complete and sympathetic support of top management, supervisors, and employees.

JOHN A. WILLIAMS
Chairman, A.G.A. Accounting Section

Alfred Fleishman, public relations counselor, who has been retained by the Union Electric Company of Missouri to assist management in public relations work, spoke on "The Importance of Customer Relations in the Future of the Industry." In his talk Mr. Fleishman emphasized the great importance to a natural monoply such as a public utility of keeping its customers satisfied. The most intensive studies of customers' habits, wants, prejudices, are necessary, and the individual customer must be dealt with as a human being, not merely as a source of revenue.

The concluding address of the general session was delivered by Martin R. Gainsbrugh, chief economist of the National Industrial Conference Board. Mr. Gainsbrugh's speech, "The Decline of Property Rights," is reproduced on page 137 of this issue of the BULLETIN.

Tuesday Morning Session

On Tuesday morning there were meetings of four groups, those interested respectively in general accounting activities, in materials and supplies accounting including purchasing and stores control, in tax accounting, and in customer accounting activities. The tax accounting group participated in the early part of the general accounting activities session and then withdrew for their own meeting after listening to a paper entitled "Consult Your Tax Man" by Everett C. Johnson, partner of Arthur Andersen & Company in that firm's Chicago office.

Presiding over the session of the general accounting activities group were co-chairmen A. A. Cullman, Columbia Engineering Corporation and O. K. Boyd, Consolidated Gas Electric Light and Power Company of Baltimore. The first paper of the session was "Micro-Filming—Pros and Cons in its Relation to the Record Retention Problem," a report whose important features were summarized by J. G. Hoffman, Consolidated Gas Electric Light and Power Company of Baltimore. The report is a very complete recital of the practical advantages and disadvantages in the use of microfilm as a form for preserving utility records, and should be of great value to any management which has under consideration the adoption or extension of such procedure.

Leith V. Watkins, Panhandle Eastern Pipe Line Company, dealt with "The Troublesome Problem of Depreciation" in a challenging paper throwing, "darts to provoke some new thinking." He proposed that the amount of depreciation charges instead of being accumulated in a reserve fund against book losses at the time of actual capital retirement, should be considered and accounted for as a current return of capital to the stockholder.

Annual Reports

Weston Smith, vice president, *Financial World*, New York, spoke on "Annual Reports as Public Relations Documents," and cited a marked trend toward making financial reports more informative and easier to read. Mr. Smith stated that in 1946 the greatest improvement in form and content of annual reports was shown by the public utilities industries.

At the luncheon meeting on Tuesday of the General Accounting Activities group, the report on "Employee Rating Plans" of the Committee on Employee Relations was submitted in summary form by E. R. Eberle, Public Service Electric and Gas Company of New Jersey. At this meeting W. R. Clements, Public Service Electric and Gas Company, gave an interim report on the new "Accounting Developments Service" which is designed to make promptly available to accountants of the electric and gas industries new machines, appliances, devices, procedures, and methods.

The Materials and Supplies Committee also held a closed luncheon meeting on Tuesday and resumed their session Tuesday afternoon to consider the report of the Stores Operations and Equipment sub-committee, B. H. Barnes, The Connecticut Light and Power Company, chairman. On Wednesday morning the committee discussed two papers constituting the report of the Purchasing and Stores Accounting sub-committee, one on a "System of Codification of Materials and Supplies" presented by R. M. Robinson, Republic Light Heat and Power Company; and another on "Methods of Machine Inventory Accounting Records" by O. G. Peterson, New York State Electric and Gas Corporation.

Wednesday afternoon members of the committee participated in a trip to the storeroom, accounting department, and other points of interest of the Laclede Gas Light Company.

The Tax Accounting Committees, after their withdrawal from the session of the General Accounting Activities group on Tuesday morning, went into their own session which was principally devoted to informal consideration of current tax problems. Some of these, discussed at this and two subsequent joint sessions of the Tax Accounting Committees, were similarly occupied.

The Customer Activities Accounting group held a session on Tuesday morning presided over jointly by A. W. Fyfe, Consolidated Edison Company of New York, Inc., and Glenn Ray, Indianapolis Power and Light Company. The first paper was presented by J. C. Faris, Union Electric Company of Missouri, being a "Review of Collection Practices From the Standpoint of Cost," which is reproduced on page 145 of this issue of the BULLETIN.

Billing Fuel Adjustments

An interesting interim report on methods of "Billing The Fuel Adjustment in Rates" dealt with the accounting phases of the fuel adjustment clause which is of increasing importance in utility rate schedules, presented by H. F. Quad, Public Service Electric and Gas Company of New Jersey. "Billing of fuel adjustments" the report stated, "is accepted in our industry as a flexable means of promptly reflecting rapid and unforeseen increases or decreases in fuel costs." The interim report briefly summarized a number of billing procedures used by different companies having fuel adjustment clauses in their state schedules.

R. T. Dudrear, Philadelphia Electric Company, presented a project committee report on "Training Program and Manual for Meter Readers" which summarized the results of a survey of company practices in this respect.

Many types of "Customer Information Manuals" were briefly described in another project committee report presented by B. M. Scherer, Citizens Gas and Coke Utility Company. The report analyzed these various types and attempted to point out the factors that make for successful manuals.

Luncheons were held Tuesday for the General Accounting Activities group, the Materials and Supplies

Committee of A.G.A. and separately for each of the three committees constituting the Customer Accounting Activities group,—The Customer Accounting, Customer Collections, and Customer Relations Committees. For the three latter the luncheon meeting continued into the afternoon for informal discussion of various reports and papers.

At the Customer Accounting luncheon, "The Mechanics of Irregular Billing," a project report presented by J. D. Elliott, The Detroit Edison Company, reviewed procedures followed by some fifty-seven companies.

Walter J. Ott, Cincinnati Gas and Electric Company, presented another report similarly derived from a survey of forty-six companies on "Production Yardsticks," which was developed under three heads; organization for production, records for production, and suggested statistical yardsticks.

Production Yardsticks

An interim report on "Cost Accounting for Customer Activities" presented by A. G. Burnett, New York Power and Light Corporation, asserted a need for a system of cost accounting in sufficient detail to permit significant comparisons between customer accounting costs of different companies as well as better control of such costs in any particular company.

The Customer Collections luncheon meeting discussed "Residential Deposits—Are They Necessary?" an interim report presented by L. J. Rauh, Consolidated Gas Electric Light and Power Company of Baltimore, and another interim report presented by O. B. Cook, Battle Creek Gas Company, on "'Pet' Collection Procedures."

The topics for the Customer Relations luncheon were "Appliance Service Policies," a discussion led by J. Gordon Ross, Rochester Gas and Electric Company and W. R. Keagy, The Cincinnati Gas and Electric Company; and "Experiences With Saturday Closing of Company Offices," presented by W. A. Kelly, Consolidated Gas Electric Light and Power Company of Baltimore.

The two General Accounting committees met Tuesday afternoon in a session presided over by J. C. Cross, Hope Natural Gas Company, and O. K. Boyd, Consolidated Gas Electric Light and Power Company of Baltimore. A report of the sub-committee on Functional or Responsibility Accounting was presented by A. T. Gardner, Delaware Power and Light Company. This report discussed the ends to be served by functional or cost accounting and described in outline a type of internal cost system declared to be "simple in application and economical to administer, particularly for small or average sized companies." J. K. Laurentz, Brooklyn Union Gas Company, presented a report of the joint sub-committee on Internal Auditing, outlining its work during the administrative year to date.

H. S. King, manager of the New York office of Price, Waterhouse & Company, then gave a paper on proper coordination between the internal and independent auditor. He said that there is still room for improvement in the elimination of overlapping work and consequent unnecessarily duplicated effort. A. J. Frazer, Jr., West Penn Power Company, as chairman of a joint sub-committee on "Machine Applications for General Accounting," next introduced R. O. Linville, Kansas City Power and Light Company, who described a machine installation for accounts payable and stores accounting recently adopted in his company.

The final item on the General Accounting Committee's Tuesday afternoon session was a report presented by Arthur Skelton, Peoples Gas Light and Coke Company, chairman of a joint sub-committee on Methods of Payroll Distribution. This report analyzed and summarized the replies by thirty-three companies to a questionnaire covering details in the distribution of labor costs to appropriate accounts.

Property Records

The two Plant Accounting Committees met jointly Tuesday afternoon with a large attendance. Co-chairmen presiding were H. J. Rustad, Equitable Gas Company and L. C. Pursell, Pennsylvania Power and Light Company. The first item was a paper presented by A. J. Mayotte, Consumers Power Company, entitled "Do Your Property Records Reflect Your Physical Plant?" Mr. Mayotte described a sampling method for control of physical inventory of mass property which he said had demonstrated its accuracy within a margin of error negligible for practical purposes. K. R. Watson, Philadelphia Electric Company, then presented a sub-committee report on the "Problem of Providing Construction Accounting Forces With Accounting Personnel on Major Projects."

The report of a sub-committee on "Property Records for General Equipment" was given by A. L. Davies, West Penn Power Company, chairman. This report summarized the practices of fifty-one companies with respect to the records they maintain for units of general equipment.

Depreciation Accounting

The Depreciation Accounting Committee of the Edison Electric Institute on Tuesday afternoon, under the chairmanship of A. H. Kuhn, Pioneer Engineering and Service Company, heard a paper on "Current Trends in Depreciation Accounting Practices" presented by E. G. Hery, Consolidated Edison Company of New York, Inc.

Maurice H. Scharff, consulting engineer, reviewed the depreciation accounting practices of two of the large government power projects, Tennessee Valley Authority and Bonneville Power Administration. Mr. Scharff noted that there still exists a lack of uniformity in depreciation accounting which he attributed largely to the unfortunate definition of depreciation as "loss in service value" in the uniform systems of accounts for electric and gas utilities adopted by the National Association of Railroad and Utilities Commissioners and the Federal Power Commission.

Tuesday evening there was a dinner attended by nearly all registrants, some of whom were accompanied by their wives. The co-chairmen of the E.E.I. Accounting Division General Committee and the A.G.A. Accounting Section, respectively H. B. Hardwick and John A. Williams, presided jointly. Robert W. Hendee, first vice president of the American Gas Association, voiced appreciation of the accountants' importance to the utility industries. The speaker of the evening was Clayton Rand, publisher of the *Dixie Press* and *Dixie Guide*, of Gulfport, Mississippi.

On Wednesday morning several sub-committees of the two General Accounting Committees held meetings and so did the Materials and Supplies Committee of the A.G.A. and the De-

preciation Accounting Committee of E.E.I. The two Plant Accounting Committees met jointly, as did the two Tax Accounting Committees. The entire Customer Accounting Activities group met in one session.

Accounting Machines

At the Wednesday morning session of the sub-committee on Machine Applications for General Accounting, presided over by A. J. Frazer, Jr., chairman, representatives of four of the larger manufacturers of accounting machines described their latest improvements in machines adaptable for general accounting purposes. The speakers and the companies which they represented were: G. A. Roberts, International Business Machines Corporation; A. Draper, Remington Rand, Incorporated; J. M. DeWolf, The National Cash Register Company; A. L. Knaff, Burroughs Adding Machine Company.

The sub-committee on Internal Auditing held an unusually large and lively meeting presided over by J. K. Laurentz, Brooklyn Union Gas Company, chairman. Various types of internal audit procedure employed in different companies were described and critically discussed. These included: "Internal Audits of Fixed Assets," by E. J. Armbruster, New Orleans Public Service, Inc.; "Internal Audits of a Purchasing Department," by C. J. Nichols, Consolidated Gas Electric Light and Power Company of Baltimore; "Internal Audits of Cost-Plus-A-Fixed-Fee Contracts," by B. J. Buzanga, Consolidated Edison Company of New York, Inc.; and "Internal Audits of a Stores Department," by D. G. Martin, Pacific Gas and Electric Company.

Further informal discussion of the reports presented by the respective sub-committees took place at the Wednesday morning meetings of the committees on Functional or Responsibility Accounting, Methods of Payroll Distribution, and Protection and Preservation of Records.

At the joint meeting of the two Plant Accounting Committees a subcommittee report on "Grouping Items Into Pricing Units" was presented by J. A. Ryan, Consolidated Edison Company of New York, Inc. This summarized the results of a questionnaire on the practices of some thirty-eight companies in the development of pricing units for ten electric and four gas mass distribution property accounts. J. F. Preish, Michigan Consolidated Gas Company, then delivered the report of a sub-committee on "Use of Trial Unit Prices in Pricing Units of Property," in the absence of the subcommittee's chairman, E. D. King, The Detroit Edison Company. This report described a practical method for apportioning labor and incidental installation costs of a construction job to specific units of property.

The Depreciation Accounting Committee of the E.E.I. held another well-attended meeting on Wednesday morning. Its principal topic was "The Use of Judgment in Estimating Life Characteristics of Depreciable Property," a paper prepared jointly by G. P. Logan, Philadelphia Electric Company and G. T. Dwight, The Hartford Electric Light Company. The paper referred to a report prepared in 1942 by the Depreciation Committees of the E.E.I. and A.G.A. entitled, "An Appraisal of Methods for Estimating Service Lives of Utility Properties," and stated that the E.E.I. Depreciation Accounting Committee is working on a new edition of this report giving effect to the most recent developments.

Customer Accounting

The Customer Accounting Activities group at its Wednesday morning session was again presided over by A. W. Fyfe and Glenn Ray. The meeting opened with a talk on drive-in pay stations for utility customers entitled, "They Like to Pay the Easy Way," given by H. S. Hahn, The Ohio Fuel Gas Company, and illustrated by a film projection. G. E. Curtis, Boston Consolidated Gas Company, then briefly summarized a project report on "New Developments in Electric Tabulating Card Operations for Customer's Billing and Accounting" which describes a number of applications of tabulating card techniques felt by the committee to be both novel and useful. "Techniques of Customer Sampling" were described by F. J. Porter, Jr., Consolidated Edison Company of New York, Inc. W. R. Clements again told briefly of what the new Accounting Developments Service hopes to accomplish and how the committee is going about it.

Another film, "By Jupiter," dramatized appealingly the necessity for sympathetic understanding and personal self-control in dealing with others which are basic in customer relations. The film showing was introduced by W. P. Parkhouse, Jr., New Orleans Public Service, Inc.

General Accounting Session

On Wednesday afternoon a discussion meeting of the E.E.I. Accounting Division General Committee was held, to which all interested were invited. No decisions or recommendations were made but some of the topics discussed with an indication of the trend of the opinions expressed are as follows:

Financing Capital Requirements—Utility accountants who are also their company's responsible financial officers, should make more of an effort through exchange of ideas and experiences to achieve better understanding of the financial problems involved in the industry's enormous construction program and to find the best way to solve them.

Interest During Construction—A report summarizing the practices of sixty companies showed that all but seven capitalize interest on funds tied up in construction projects and that a majority use an interest rate of six per cent. There is considerable variation, however, in the limitations on size and type of construction jobs on which interest is capitalized.

The Federal Power Commission's request for more details in annual reports on depreciation charges—Apparently few companies are in a position to supply an analsis of depreciation charges by primary plant accounts and many use overall depreciation estimates without any reference to individual accounts.

Tax Subsidies for Competing Governmental Power Developments—This topic was briefly discussed, the consensus of the meeting being that the unfairness of comparing costs of service which have to include a heavy tax burden with costs into which taxes either do not enter or play only a minor part, should continue to be emphasized at every opportunity by representatives of private enterprise utilities.

Standardization of Mortgage Indenture Provisions—The chairman referred to a letter by R. N. Benjamin, Stone & Webster Corp., chairman of

(*Continued on page* 158)

Decline of Property Rights

By Martin R. Gainsbrugh
Chief Economist, National Industrial Conference Board

An address presented before the National Conference of Gas and Electric Utility Accountants, held at St. Louis, Mo., on April 12, 1948

EXACTLY one hundred years ago two practical, as well as highly literary revolutionists set forth with some fifteen thousand words their program for the destruction of capitalism. This historic document now in its eleventh American printing, listed ten major measures by which the proletariat would use its political supremacy to gain control over the existing social orders, particularly in the most advanced countries. First on this list was the abolition of private property. These two political and revolutionary leaders emphasized throughout their long careers that private property rights were the basic pillars of capitalism. I am in highly eminent company, therefore, in centering my remarks this afternoon on private property, its functions, and its growth and decline.

The Communist Manifesto

The historic document to which I refer you undoubtedly recognize as the "Communist Manifesto," published by Karl Marx and Frederick Engels in 1848. This work formalized the philosophies and programs of the secret revolutionary societies which had sprung up in Paris during the preceding decade. Actually the word "communism," a review of economic literature reveals, was not coined until about 1840, although some of the concepts and fallacies embodied in this doctrine are as old as man himself.

One hundred years ago this country of ours was worth about seven billion dollars, or less than the wealth of Missouri today. Our entire national income was about 2.5 billion dollars, or say, $100 per capita. We lived primarily from agriculture. There were fewer than a million wage earners; the total value of manufactured output barely reached one billion in 1848. The United States at that time was a young country, rich in natural resources but poverty-ridden in terms of capital or tools of production. We were at best a second-rate world power, both in financial and human resources and these were further to be drained by the war between the states, which followed shortly.

American Century

The subsequent century of American growth is unparalleled in world history. With about 6 per cent, or a sixteenth of the world's area and about the same small slice of the world's population, we are today the world's industrial Colossus. Prior to the war we turned out nearly a third of the entire world's industrial production and the ratio is undoubtedly higher today. We produce today nearly half of the world's electric power, 55 per cent of its steel, 85 per cent of its automobiles and 92 per cent of all modern bathtubs. So proficient is the production process that at times our own domestic policy assumes it is automatic and will continue as if under a new sort of natural law, without regard to proper incentive or other economic factors which have stimulated output.

The founding fathers of communism stated without qualification that the "modern laborer" instead of rising with the progress of industry would sink "deeper and deeper below the condition of existence of his own class," and that pauperism would increase faster than wealth or population. Apparently false forecasts were an essential party tool from the outset. The American record of ever greater productivity, with larger slices for all who participated in baking a larger national pie is completely to the contrary. A century ago a wage earner worked about sixty-four hours a week and received for his week's labor only about a third of what he gets for forty hours currently, in terms of the real purchasing power of factory wages. As late as 1913, the United States Bureau of Labor Statistics recently estimated average weekly earnings in manufacturing were only $11 as compared with $24 in 1939 and $52 in January of this year. In dollars of constant purchasing power, weekly earnings had again been doubled in about a third of a century.

A highly graphic picture of the change in the welfare status of American wage earners exists in the contrasts between budget studies made for these groups nearly a century ago and currently. The average wage earning family shortly after the Civil War spent one-half its income for food alone. The basic physical requirements of housing, food, and clothing consumed nearly 90 per cent of all income, leaving little more than a tenth for such items as recreation, medical care, church, transportation, and the other "optional" items of consumption associated with a plane of living above the level of sheer subsistence. In contrast, the vast nation-wide survey for this group pre-war indicated that food expenditures formed slightly less than a third of all expenditures and that food, clothing and housing, combined, comprised somewhat less than two-thirds of all expenditures. This meant that workers who not so many decades ago could spend only one dollar in ten for the "optional items," or better things of life, had advanced to a stage where fully one dollar in three could be used for the ampler and finer types of consumption.*

Yesterday's Luxury—Today's Comfort

This three-fold increase in the percentage of the wage earner's budget available for travel, education, amusements, and durable consumers goods, together with other significant changes in the levels of living of millions of our families perhaps needs greater emphasis than has thus far been given it. The American story of transforming yesterday's luxury into today's comfort or necessity may seem so obvious that it suffers from repetition. But as recently as the end of last year, no

* See for further comparison of this type, "America's Resources for World Leadership," National Industrial Conference Board, 1947.

less an august body than the Council of Economic Advisors in its second annual report to the President, stated that the "ampler and finer products, while in some degree reaching most groups in the population, have in large measure gone to the relatively few who by wealth or position could claim the cream of our productive operations. Large numbers of the people have gone on subsisting on skim milk."

While I am quoting from this surprising official document, let me add another extract to which I will pay my respects later: "The small number of well-to-do will not be able to absorb the possible output of consumers' goods. Nor can they go on indefinitely accumulating ownership of the surplus above their consumption needs and investing it in ever enlarging plant for future expansion of goods for some restricted part of the population. The enlarging productions of an industrially efficient nation must grow increasingly to filling in the consumption deficiencies of the erstwhile poor."

Pattern of Progress

The record of 25 million passenger cars housed in mansions and cottages alike should dispel any wide-spread notion that our ampler or finer things have been reserved for the favored few. Some three million homes have radios, twenty-eight million homes have telephones, nearly twenty million homes have electric refrigerators and seventeen million homes have electric washers.

True, at the outset, costs of development and experimentation result in almost prohibitive unit costs for many new products. Distribution is limited to the few who are prepared or willing to pay. Those few likewise perform an important function in providing a limited but sympathetic market while the product is in its experimental stage. But if the device or product is to be profitable, mass markets must be found, volume increased, production costs and selling prices lowered.

The same pattern has been followed from fountain pen to automobile to television, currently. Within a few decades the dynamic character of our productive and distributive system has altered century old methods of cooking, cleaning, washing, and heating in almost every home in this country.

Impatient as the President's advisors may be for further penetration into the mass markets of the lowest income classes, they must concede that some of the conclusions they accept are the folklore and fiction of the groups who plot against our capitalistic society and plan its destruction at least in part through provoking discontent, irrespective of the accuracy of the charges they bring against it.

Communist Blueprint

But tempting as is this theme, let us examine not the progress manifest in our material growth, but rather the progress of this alien philosophy and, more particularly, of the Decalogue or the ten planks laid down by Marx and Engels in their blueprint for one communistic world. The "Communist Manifesto" rightly stated that "The theory of the communists may be summed up in a simple sentence: Abolition of private property." But the remaining nine planks are important supporting measures which in their net combined effect could steadily undermine property rights and leave title with the owners, but very little else. Title without control or without the right of income or sale is a paper privilege and a masquerade of property rights.

Emerson entered in his journal in May, 1848, this typical New England comment on the French Revolution: "Paris, May 6—The boulevards have lost their fine trees, which were all cut down for barricades in February. At the end of a year we shall take account and see if the Revolution was worth the trees." I have recited in some detail the record of the material progress of the United States during the past century. From this unsurpassed testimonial it is evident without possibility of challenge that capitalism did not degrade the proletariat and that the material welfare of our masses is infinitely superior to what even the staunchest advocate of "laissez faire" foresaw generations ago. Against this background of actual performance rather than political or theoretical promises, how successful was the system which brought these "miracles" to pass in defending itself against an alien, revolutionary philosophy?

The answer will undoubtedly come as a surprise to many. With the exception of private property rights, virtually every other measure proposed in the Marxian Decalogue is now either the law of our land or has been accepted as the only way of operations, that is, as common law. In fact, all of the nine planks of communism, at least as they apply to modern day society, are now embodied in the platform of each of our two great political parties.

Second only to the abolition of property rights in the Marx-Engel platform was the introduction of a "heavy progressive or graduated income tax." Through it we have steadily liquidated in a bloodless revolution the members of the top income bracket. Shortages of venture capital and the deadening of incentive to risk or to undertake additional responsibility are only parts of the price we have already paid for the acceptance of this plank. No roulette house in the world would find takers if the odds it offered were one hundred per cent loss for a bet on the red, if it turned up black, and even after the recent tax reduction, seventy-five per cent of all winnings to the house, if the red won.

Right of Inheritance

The third plank of the communist platform called for "abolition of all right of inheritance." We have modified that somewhat so that enough is left after inheritance taxes to permit a semi-orderly liquidation of large estates. But there are few thriving personally owned enterprises today, even those whose businessess are small scale in character, who do not recognize that with the death of the principals, sale of the enterprise is inevitable if the tax collector is to be kept at bay. The tax disadvantage of remaining in business was undoubtedly one of the most potent arguments for the recent increase in sales and mergers of small and medium sized businesses, particularly where the enterprises were nearing the close of their productive life span.

Let me complete the list without more than brief comment on some salient features. In addition to those functions of private property, heavy progressive income taxes and abolition of right of inheritance, the measures called for were:

4. "Confiscation of the property of all emigrants and rebels."

At the moment we are planning to ferret out for foreign countries funds

placed with us for their natives and to police the return of such funds, and perhaps even of their owners, to their countries of origin.

5. "Centralization of credit in the hands of the state by means of a national bank with state capital and an exclusive monopoly."

While our federal reserve system is nominally private in character, few could argue that control over the money supply, credit or interest rates is not entirely dominated by government decision today.

6. "Centralization of the means of communication and transport in the hands of the state."

No comment need be offered on the extent to which this has been accepted as democratic procedure.

7. "Extension of factories and instruments of production owned by the state; the bringing into cultivation of waste land, and the improvement in the soil generally in accordance with a common plan."

The federal government today owns about 150 billion dollars of our national wealth, according to the most recent estimates assembled. With the onset of World War II it became the largest owner of industrial plant in the country and still remains so. Control over atomic energy for industrial as well as military purposes rests with it. The onset of the next depression will undoubtedly find a growing demand that government-owned plant be placed in production to provide necessary goods for those who cannot purchase them through normal market mechanisms. As for agriculture, we continue to subsidize this branch of industry through public funds, even though its income and profit position is higher than ever before in the nation's history.

Obligation to Work

8. "Equal obligation of all to work. Establishment of industrial armies, especially for agriculture."

Thus far we have reserved this for war purposes, although the erosion of property rights and income has been such as to leave few with any other alternative.

9. "Combination of agriculture with manufacturing industries; gradual abolition of the distinction between town and country by a more equitable distribution of the population over the country."

This we have done to such a degree, that we have about tapped our last resources of labor available for the dirty, grimy, sweaty work that still remains to be done in this age of machines. We first cut off the flow of cheap, willing, common, labor through immigration barriers, we are now exhausting our second major source, the various minority groups and excess farm population. In the decades ahead, as more widespread education further decreases the tolerance for heavy physical work, the social and economic utility of common labor will rise further, adding another rigid element in our wage cost structure to that already introduced by the growth of labor unions.

Free Education

10. "Free education for all children in public schools. Abolition of child factory labor in its present form. Combination of education with industrial production, etc."

Here our 20th Century model goes beyond Marxism. We're extending free education to hundreds of thousands of war veterans and are moving toward making a college education available at public expense to all who wish it. Children are fed in increasing number at school from federal grants and increasing federal assistance is offered not only the children but their mothers, the aged, the blind, infirm, etc.

Where, throughout this long list of revolutionary proposals of a century ago has the existing order resisted major encroachment? An objective observer would concede that except for the retention of the right of private property, we now accept as part of our moves and folkways virtually all of the revolutionary proposals of a century ago. "But," our friendly observer might add, "whatever the origin of these social reforms, we have kept our basic form of government unchanged, and furthermore, we have come through the most costly war ever known to the highest level of production, employment, and consumption, we have ever enjoyed. The very figures on material progress you have cited ought to stand as evidence that the system of voluntary capitalism, despite the changes time has introduced, continues to function effectively."

The wrong answer too frequently given to this type of question is that we are in a temporary postwar spurt of activity which will subside once the postwar backlog of demand for durable goods is exhausted, or once the "hot money" poured out during the war is neutralized, etc. Far too many defenders of the capitalistic faith have unwittingly or reluctantly accepted another Marxian dogma, namely that capitalism contains within itself the seeds of disaster. They fail to point out that the war at least temporarily removed some of the restraints on capital formation and for the first time in more than a decade provided industry with funds which could be tapped for expansion purposes.

The right answer would attribute the present surge to the reappearance of capital formation, made possible by the elimination of excess profits taxes at the close of the war, coupled with business expansion for which funds were accumulated during the war. We stumbled into the former, abolition of Excess Profits Tax, because those high in administration circles felt that a major depression would engulf this country at the war's end, and lower corporate taxes, it was thought, might mean a million or two fewer unemployed during this painful period. As for wartime accumulations they likewise reflected in good part worker-estimates by the tax-minded of the volume and economies of volume American industry could generate, given access to the funds for securing greater toolpower.

It is this fundamental element of our expansion, past and present, to which we shall turn next.

Our Past Progress Stemmed from Capital Investment

The rise of a nation's economy, as well as its fall, is reflected in changes in three ratios a) the number of people at work, b) their hourly input of labor or the intensity with which they apply their human energies to their work and c) the toolpower provided to facilitate production. Over the past century we have decreased the proportion of our population gainfully occupied. At the same time we have reduced the rate of utilization of the human energy of those at work

through shorter working hours. Despite this curtailment of labor input, however, our national production rose because we supplied more than enough toolpower and capital to offset lower human input.

Our higher material welfare stems from the fact that more goods were produced per manhour of labor with each succeeding decade. Higher output per manhour made possible higher real wages. Over the century, however, output per manhour increased at the seemingly snail's pace of slightly less than 2 per cent per year. Even in manufacturing, in which technical innovation was most rapid, output per manhour rose by no more than 3 per cent per annum.

During the past few years we have fallen into the habit of granting wage increases of far greater magnitude than this rate of increase in productivity. Higher wage increases than productivity gains traditionally mean higher unit labor costs and higher prices of furnished, fabricated goods or commercial services. Yet we blame our price indicators or our commercial enterprises for higher prices rather than correct our faulty wage procedures.

Productivity Gains Have Been Slow But Cumulative

Productivity has not increased significantly since the war's end. If we could raise national productivity to 3 per cent per annum it alone would give us nearly three times our present national output over the next century. A productivity rate of 4 per cent would yield our economy seven times as much production over the next hundred years. Even our past rate of only 2 per cent has varied as to our present high world supremacy. But productivity gains in their essence can come only from broader and deeper capital investment.

Labor has been quick in recent years to look upon gains in productivity, whether actual or forthcoming, as its own. But such gains arise primarily from toolpower and must be shared with the provider of tools, if increasing toolpower is to be provided *voluntarily*. Consumers and workers in other industries not susceptible to rapid, technical change—e.g. education, clergy—must also be permitted to share in terms of lower prices or improved quality.

Our long-term record demonstrates that over the past market forces have rationed productivity gains fairly among these claimants. During the Twenties gains in productivity were apparently not distributed quickly enough in terms of lower prices or higher wages. This may have contributed significantly toward the subsequent economic collapse. Currently, far too much of the slow, unsatisfactory increase in productivity has been channeled into wages and far too little has gone toward checking inflationary prices.

Additions to Toolpower Have Been Declining Over Past Three Decades

Careful records of our stock of physical property revealed that since World War I when most of the Marxian changes were incorporated in our capitalistic structure, the rate of growth of durable reproducible wealth, that is our net stock of construction and equipment, began to decline. From 1880 to 1900 we increased our physical stock of plant and equipment by 35.5 per cent, from 1900 to 1919 by 39.1 per cent, from 1919 to 1938, by 23.4 per cent. (All in constant dollars, so that influence of price change is removed).

With each recent decade we added less new toolpower to our toolpower-human energy equation. There is also some evidence that our entire physical plant had shrunk in size and was smaller in 1939 than in 1929. This retardation in growth of capital input together with the reduction in the proportion of our population at work for fewer working hours may suggest why the size of our national pie prewar was so unsatisfactory to all claimants.

Return to Property Owner Shrinking

In the closing half of the past century the suppliers of tools received about a fourth of the income produced from such tools. Rents (net after expenses), dividends and interest (almost entirely from private, productive sources), were each items of importance as warranted claimants to the national output. With each decade of the 20th Century the property owner found his slice of the national pie diminishing. Rentals have declined from about 8 per cent of national income to half that percentage. Dividends have likewise been cut in half. Interest as a source of income is almost negligible, insofar as it is derived from private sources.

In 1929 the return for the use of private property totaled about eighteen billion or 20.8 per cent of that year's national income. In 1946, although our national income had doubled, properties' share was 2.5 billion dollars less than in 1929. Payments for the use of tools therefore declined to slightly less than 9 per cent. And yet it is from this group, in good part from investment of property income, that risk funds must come, unless government is to undertake this role, too. A recent federal reserve survey revealed that only one of every twelve families owned any corporate securities at all, while George Torborgh has estimated that one thousand individual stockholders account for about half of all corporate stocks held by individuals. The capital pool for risk purposes, deep as it has proved, is not fed from millions of small streams, but rather by a relatively few major rivers. The contributing waters have been steadily drained by the anti-property measures which I described earlier.

The Small Investing Group are the Forgotten Men

Wage adjustments, at least to the extent of cost of living increases, are now almost a matter of course. Commercial enterprises, too, are aware of their increased costs of doing business and grow more realistic in entering true costs of replacing machinery bought at prewar bargain basement prices or in costing into current prices higher inventory replacements. But what of the investor who supplies venture funds primarily from property income? Rents are controlled at prewar levels, interest likewise has been reduced primarily through government pressure to about 3 per cent currently as compared with 6.3 per cent three decades ago and slightly above 5 per cent in 1929.

As for dividends, they were a smaller percentage of corporate profits after taxes last year than in 1946. Many corporations found it necessary to plow back more of their earnings in 1947 than in any other prosperous year. In 1929 corporations paid out about 70 per cent of their earnings to their owners, in 1946 about 45 per cent was so distributed, last year near-

ly twice as many dollars were plowed back as were paid out.

Investors are conscious of industry's capital problems and for the most part are sympathetic. But who speaks for them when as in some instances prices are cut and earnings restrained to court public or political favor? If the investor is not to recoup his losses of the thirties at peak levels of operation, when is he destined to replenish or extend his capital pool? His living costs and taxes have not been immune from the same infection as other income recipients, while his earning power has been most rigidly controlled.

Retained Earnings Retard Venture Capital

It may be contended, and has been, that the availability of venture capital has been augmented by the great expansion in earnings retained by corporations. Last year such funds approached ten billion dollars as compared with about 6.3 billion in 1946 and 2.6 billion in 1929. But retained profits in one sector of industry are not necessarily available to other sectors of industry, nor do they flow automatically from capital-abundant members of one industry to capital-hungry firms in the same industry. Small and medium sized firms, likewise, may not have access to pools of such internal funds. In 1947, for example, the electric and gas industries needed about 2 billion dollars, primarily for financing plant expansion. Its retained profits, however, were only about 200 million dollars. Conversely, manufacturing corporations with retained profits of about $65 billion faced the need of adding only $7 million in new plant and equipment. The avenues of financing for public utilities were undoubtedly conditioned by the retention of capital in other corporate enterprises for internal financing rather than their distribution to all sectors of the market through traditional venture capital channels.

The redistribution of income and wealth, primarily through income and inheritance taxes, has drastically altered the pattern of savings in this country. This has further restricted the availability of risk capital.

When savings were concentrated in the top income brackets, this surplus would be readily tapped for venture purposes. Today the major proportion of savings are made by the middle income groups, much of these savings and virtually all of the savings of the lower income groups flow to government or to sheltered forms of savings, which are legally barred from risk ventures. Personal savings last year totaled about $11 billion as compared with less than $4 billion in 1929. But an official report on business financing the Department of Financial Service recently released contains tucked away in a footnote the following:

> "The available data on individual's savings, though highly tentative for the early years, indicate today as in the thirties, a higher proportion of savings takes the form of cash and deposits, U. S. Government securities, and insurance than in the late 1920's while direct investment in corporate securities has become relatively less important."

Government Financing of Risk Ventures

In a sense the R.F.C. and S.W.P.C. might well be regarded as experiments by government as a source for venture capital. All such moves are confessions of weakness in voluntary capitalism which is characterized by a predominance of capital and sufficient flexibility so that capital funds will automatically go into areas of expansion and retreat from areas of contraction.

Once public funds are tapped for risk purposes, government must determine increasingly where capital shall flow, what shall be produced, what shall be consumed, and ultimately who shall consume and how much. This is the opposite goal to the incentives of acquisition, competition, and full risk failure or unrestricted chances of success which is the spirit of capitalism. This is compulsory capitalism, the essence of communism as it is practiced in Russia today.

Capitalism Contains Within Itself the Seeds of Expansion

The profit mechanism is again demonstrating its effectiveness as a productive and distributive agent. It has flourished because a temporary pool of venture capital was again open to it. In part this pool grew big because funds which would otherwise have gone into fixed capital were set aside as liquid assets, in part, because tax treatment became at least semi-favorable to profit-making and risk-taking. Price was again permitted to perform its equilibrating function.

But the pool, at best brought to its previous high water mark has been tapped without being in turn replenished. The recent tax cut is only a token of the reforms required if enterprise is again to flourish under voluntary, competitive forces.

New Faith for Capitalism

The past year or two are the first occasions national attention has been focused on the deficiencies of capital rather than on the deficiencies of purchasing power under consumption in our lifetime. Exploration of risk capital, the role of the investor, the economic functions of profit and property and even of capitalism are providing our law makers, editorial writers, and even the man in the street, at times, with new intellectual vistas. Certainly the man in the street is more responsive today to defending what remains of capitalism against further inroads of communism than has been true in many years. It may be later than we think but the time may never be riper than the present for a reconsideration of some of the communistic measures we have accepted too long without challenge.

Most of all the disciples of capitalism need faith. Its enemies have the faith of all reformers; their proposals are always affirmative; they promise much, even though they can point to no satisfactory record of performance anywhere in this world. The defenders of capitalism are more aware of its defects than of its virtues. Its long term performance is unmatched, but the alien philosophy has undermined the confidence of many. They are faint-hearted in its defense lest they be proved wrong by the next bigger and better depression. In too many minds the seeds of disaster are already present. In too few can there be found a view that capitalism contains within itself the same seeds of expansion as in the past century. What is needed is a favorable environment for further capital accumulation and a social and legislative climate that will again make possible accumulation of private property and a greater degree of voluntary, personal control over its use and disposition.

Frequency of Starting Room Air Conditioners

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An abstract of a paper presented at a meeting of the Transmission and Distribution Committee, E.E.I., in Chicago, Ill., on May 3-4, 1948

DURING joint discussions in 1945 between the Edison Electric Institute and the Air Conditioning and Refrigerating Machinery Association concerning locked rotor currents for room air conditioners, the frequency with which such devices are started received considerable attention. It was recognized that permissible voltage drops, and therefore locked rotor currents, are a function of frequency of occurrence; but in the absence of any test data as to just how often room coolers are started, the discussion was necessarily confined to speculation as to the probable use which the owner of a room cooler would make of it.

The opportunity to secure some test information on this subject arose in 1947, when the Rates and Standard Practice Department of the Philadelphia Electric Company decided to make a survey of the summer load characteristics of a number of residential customers using room coolers. It is the purpose of this paper to summarize the starting data obtained by graphic ammeters in 17 locations, and to draw such conclusions as seem warranted. The fact that these tests represent but a small sample in but one geographic area is well recognized; they are presented, however, as the first test data available on the subject and with the hope that other companies will find it worthwhile to make similar surveys.

17 Test Locations

The seventeen test locations were selected to cover a wide range as to type of neighborhood, economic status of the customer, etc. All involved either a ½-hp or a ¾-hp room air conditioner. The data reported are for compressor motors only.

The seventeen units accounted for 768 starts during the eleven-week period. These 768 starts are broken down by customer, by months, and by location of the unit in Table I. As might be expected, the number of starts per customer varied over a wide range. There was likewise considerable variation in the duration of the runs. Some customers made runs of only a few minutes; in other cases, runs of several days duration were recorded the longest being slightly over 95 hours; several in excess of 30 hours were noted. Duration of runs is important in affecting frequency of starting i.e., long running hours on these devices will in general mean fewer starts. Table I also gives the total running hours for each unit for the season; these were scaled from graphic ammeter charts and are therefore approximate. To indicate day or night operation, the running hours have been divided into those occurring between 6 a.m. and 6 p.m. and those between 6 p.m. and 6 a.m. It should be noted that this division is based on Eastern Standard Time and that the community was operating on Eastern Daylight Saving Time.

Table II classifies the 768 starts according to the hour of the day in which they occurred, both numerically and on a percentage basis. It will be observed that bedroom units may be started any hour of the day or night, but only one hour, i.e., 4 to 5 p.m.

SUMMARY OF STARTS AND RUNNING HOURS CLASSIFIED BY CUSTOMER, MONTHS, AND LOCATION OF UNIT IN THE HOME

NOTE: RUNNING HOURS ARE STATED IN HOURS AND MINUTES. THE DIVISION OF THE DAY REFERS TO EASTERN STANDARD TIME.

UNIT	NUMBER OF STARTS				APPROX. RUNNING HOURS (2½ MO.)			
	JUNE 16-30	JULY 1-31	AUGUST 1-31	TOTAL	6AM - 6PM	6PM - 6AM	TOTAL	AVER. HOUR PER START
	BED ROOM 13 UNITS							
A	1	31	39	71	70 - 05	21 - 40	91 - 45	1 - 17
B	4	9	13	26	158 - 40	215 - 15	373 - 55	14 - 23
C	4	9	10	23	91 - 40	253 - 40	345 - 20	15 - 01
D	5	13	6	24	93 - 35	137 - 30	231 - 05	9 - 38
E	14	54	15	83	71 - 45	161 - 30	233 - 15	2 - 49
F	14	29	59	102	87 - 25	126 - 00	213 - 25	2 - 05
G	3	4	8	15	71 - 05	28 - 15	99 - 20	6 - 37
H	4	10	8	22	16 - 20	56 - 20	72 - 40	3 - 18
I	12	14	17	43	132 - 20	63 - 40	196 - 00	4 - 34
J	8	37	30	75	518 - 35	59 - 55	578 - 30	7 - 43
K	5	15	14	34	114 - 00	215 - 25	329 - 25	9 - 41
L	0	0	7	7	13 - 45	42 - 55	56 - 40	8 - 05
M	10	29	7	46	130 - 30	274 - 05	404 - 35	8 - 48
TOTAL	84	254	233	571	1569 - 45	1656 - 10	3225 - 55	5 - 39
	LIVING ROOM 4 UNITS							
N	5	18	11	34	43 - 00	76 - 25	119 - 25	3 - 31
O	7	22	76	105	185 - 35	196 - 55	382 - 30	3 - 38
P	3	17	23	43	46 - 40	62 - 00	108 - 40	2 - 32
Q	0	3	12	15	81 - 00	19 - 15	100 - 15	6 - 41
TOTAL	15	60	122	197	356 - 15	354 - 35	710 - 50	3 - 36
	TOTAL 17 UNITS							
TOTAL	99	314	355	768	1926 - 00	2010 - 45	3936 - 45	5 - 08

Table I

(5 to 6 p.m. EDST) contains as many as 8 per cent of the total. The percentage distribution of bed room unit starts is considerably flatter over the day than the distribution of living room starts, which peak sharply between 3 and 6 p.m. (4 to 7 p.m. EDST), when each of three hours contains more than 12 per cent of the total living room unit starts, and the three hours combined produce more than 38 per cent of the total. If these results are typical, it is evident that the shape of the plot of hourly distribution of *all* starts, i.e., bed room and living room units combined, will be considerably influenced by the proportions of the bed room and living quarter units which make up the total. In this case, bed room units accounted for 76.4 per cent of the total, whereas for all the units load-tested in Philadelphia they accounted for about 73 per cent of the total. Whether or not these proportions are representative should be determined by similar sampling in other cities.

Table III summarizes the daily starts of each group of units for the entire eleven weeks. The most significant part of Table III, however, is the data on maximum number of starts for any unit for the day and for any hour of the day, i.e., maximum starting frequency for individual units. The highest daily starting rates occurred on August 13, 14, 15, 16, 20 and 31. Unit A was responsible for the eight starts on August 13, Unit 0 for the 19, 38, and 8 starts on August 14, 15 and 16, respectively, and Unit F for the 12 and 9 starts on August 20 and 31, respectively. Units 0 and F were definitely known to be on automatic operation, whereas automatic operation of Unit A is suspected although the customer claimed manual operation only. It will be noted from Table I that Units 0 and F have respectively 105 and 102 starts for the season, totals which are considerably greater than those for other units.

Fortunately, most room coolers have in the past been provided with manual control only, or have been operated under manual control most of the time; therefore average starting frequency is low, as shown by the following data:

	Number of Starts	
	Total	*Per room cooler per day*
June	99	0.388
July	314	0.595
August	355	0.674
July and August	669	0.635
June, July and August	768	0.587

These starting rates of low frequency no doubt account for the lack of flicker complaint that so far has been the experience. However, it is important to note that present experience is based on low saturation of this device, and that if additional room coolers are connected to the distribution system to the degree where several of them appear on the same secondary, even though they are manually controlled, the effect is to increase the number of starts and therefore voltage flickers occurring on that secondary. Unfortunately, every customer on the secondary sees all or some part of every flicker from every start on every air conditioner.

These considerations lead to the conclusion that the future importance of the room air conditioner as a starting flicker problem on the distribution system depends on two factors, namely; (1) the intention of the air conditioning industry with respect to the development of the room cooler market, and (2) the use of manual or automatic control on the units produced.

It will be recalled that predictions of future room cooler sales by the air conditioning industry were the basis of the 1945 report that first brought these devices to the attention of this Committee as a possible distribution system problem. At that time, apparently conservative industry predictions called for room cooler sales in excess of 100,000 units in the second year after the War, with a five-year total of more than 700,000 units. According to reports of the Bureau of the Census, Industry Division, shipments of self-contained air conditioners of the room type for the twelve months ending September 30, 1947, totaled 47,490 units. Thus postwar production apparently has not

HOURLY DISTRIBUTION OF STARTS

NOTE: EASTERN STANDARD TIME

HOUR OF DAY	NUMBER OF STARTS			PERCENT OF TOTAL		
	BED ROOM	LIVING ROOM	TOTAL	BED ROOM	LIVING ROOM	TOTAL
MN - 1AM	9	2	11	1.58	1.02	1.43
1 - 2	6	0	6	1.05	.00	.78
2 - 3	5	0	5	.88	.00	.65
3 - 4	10	0	10	1.75	.00	1.30
4 - 5	3	1	4	.53	.51	.52
5 - 6	13	1	14	2.28	.51	1.82
6 - 7	11	3	14	1.93	1.52	1.82
7 - 8	28	4	32	4.90	2.03	4.17
8 - 9	32	2	34	5.61	1.01	4.43
9 - 10	33	4	37	5.78	2.03	4.82
10 - 11	17	7	24	2.98	3.55	3.12
11 - N	27	9	36	4.73	4.57	4.69
N - 1PM	32	13	45	5.61	6.60	5.86
1 - 2	35	12	47	6.12	6.09	6.12
2 - 3	35	17	52	6.12	8.63	6.77
3 - 4	35	24	59	6.12	12.18	7.68
4 - 5	47	25	72	8.23	12.69	9.38
5 - 6	38	27	65	6.65	13.71	8.46
6 - 7	32	16	48	5.61	8.12	6.25
7 - 8	26	13	39	4.55	6.60	5.08
8 - 9	28	8	36	4.90	4.06	4.69
9 - 10	25	9	34	4.38	4.57	4.43
10 - 11	32	0	32	5.61	.00	4.17
11 - MN	12	0	12	2.10	.00	1.56
TOTAL	571	197	768	100.00	100.00	100.00

Table II

approached the earlier predictions, a situation probably accounted for to a large extent by a prolonged strike at a plant of one of the major producers. However, in recent conversations, industry spokesmen anticipated the manufacture of 75,000 to 100,000 units in 1948 and pointed out that the huge domestic market is still practically untapped.

With respect to the use of manual or automatic control in the future, recent discussion with industry representatives indicated that none of the manufacturers is now promoting automatic control and some definitely recommend against it. Other manufacturers can provide automatic control as optional equipment, thinking it may be of some advantage in connection with bed room units.

Thus for the future, it appears that the electric utility industry can look forward to a very considerable increase in the number of air conditioners on their systems; these units will be mostly manually controlled, and mostly located in areas of relatively light load density.

It is well known that the compressor motor on these devices must have high starting torque and therefore high locked rotor current. It has also been pointed out that in at least some areas, these devices are low revenue producers in relation to their demand on the system and therefore it is difficult to justify expenditures for voltage drop correction. The data herein presented confirm the low annual load factor, as the average use of the seventeen room coolers as determined approximately from charts, was only about 231 hours for the June 16-August 31 period. The full air conditioning season of course extended somewhat beyond these dates, and it will be interesting to see the final results more accurately determined from demand and watthour meter readings on all the units under test for the complete season. Previous tests of domestic central plant air conditioning installations have shown an annual load factor of only 3.5 per cent or about 300 hours' use of demand.

Under these severe conditions, it is fortunate that these devices are usually manually controlled and will continue to be so. The low starting frequency shown generally for individual units in the Philadelphia tests, should therefore continue to be the experience. If this proves to be the case, then saturation can increase until several units appear on the same secondary and combined starting frequency of all of them as a group causes serious flicker complaint.

It is believed that the general answer to the question of power supply to room air conditioners in residential areas lies in the joint work of EEI and ACRMA referred to at the beginning of this report. It will be recalled that the agreement between these groups provided the following:*

1. That EEI recommended to its member companies the general adoption of 40 amperes locked rotor as the permissible starting current for infrequently started 115-volt single-phase motors;
2. That ACRMA recommend to its member companies the general adoption of 230 volts for all equipment having more than 40 amperes locked rotor at 115 volts.

In practice, this agreement has the effect of limiting 115-volt motors to a maximum of ½ hp. It should be noted also that the agreement is essen-

* E.E.I. Bulletin, January 1946.

(*Continued on page* 162)

SUMMARY OF TOTAL NUMBER OF DAILY STARTS AND DAILY MAXIMUM FREQUENCY OF STARTING

		NUMBER OF STARTS — DAY OF THE MONTH																												
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
		JUNE																														
BED ROOM	(13 UNITS)																4	1	0	6	1	0	0	3	2	3	4	9	14	21	16	
LIVING ROOM	(4 UNITS)																0	0	0	0	0	0	1	0	1	1	1	2	2	4	3	
TOTAL	(17 UNITS)																4	1	0	6	1	0	1	3	3	4	5	11	16	25	19	
MAX. Nº OF STARTS FOR ANY UNIT	FOR THE DAY																2	1	0	4	1	0	1	1	2	1	1	3	4	5	3	
	FOR ANY HOUR																1	1	0	3	1	0	1	1	1	1	1	1	1	1	1	
		JULY																														
BED ROOM		12	6	2	3	9	10	9	4	4	6	7	6	8	11	16	16	13	19	6	2	6	6	2	2	5	7	10	11	13	16	7
LIVING ROOM		4	1	0	1	3	2	1	0	2	1	1	1	1	2	3	5	3	5	2	0	1	0	0	2	2	1	2	3	4	4	3
TOTAL		16	7	2	4	12	12	10	4	6	7	8	7	9	13	19	21	16	24	8	2	7	6	2	4	7	8	12	14	17	20	10
MAX. Nº OF STARTS FOR ANY UNIT	FOR THE DAY	2	4	1	2	2	3	2	2	2	3	3	3	2	4	5	6	3	3	2	1	2	2	1	1	2	3	2	3	3	3	2
	FOR ANY HOUR	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1
		AUGUST																														
BED ROOM		3	1	2	2	9	4	6	3	10	2	5	8	16	11	10	13	2	2	11	19	2	7	10	13	17	18	6	0	6	4	11
LIVING ROOM		1	0	1	4	2	3	2	2	2	2	2	3	8	23	41	11	2	0	0	1	0	1	0	3	2	4	1	0	1	0	0
TOTAL		4	1	3	6	11	7	8	5	12	4	7	11	24	34	51	24	4	2	11	20	2	8	10	16	19	22	7	0	7	4	11
MAX. Nº OF STARTS FOR ANY UNIT	FOR THE DAY	1	1	1	1	3	2	3	2	6	1	2	2	8	19	38	8	1	1	3	12	1	3	4	3	3	4	5	0	5	3	9
	FOR ANY HOUR	1	1	1	1	1	1	1	1	1	1	1	1	2	5	5	3	1	1	1	1	1	1	1	1	1	2	1	0	1	1	1

NOTE: THE 5 STARTS PER HOUR OCCURRED IN 2 CONSECUTIVE HOURS ON AUGUST 14 AND 3 CONSECUTIVE HOURS ON AUGUST 15. SEE TABLE 4

Table III

Collection Practices from the Standpoint of Cost

By John C. Faris

Union Electric Company of Missouri, St. Louis, Mo.

An address presented before the National Conference of Gas and Electric Utility Accountants held at St. Louis, Mo., on April 12-14, 1948

NET profits which utility companies are permitted to earn are limited by various regulatory bodies. Labor and material costs have continued to mount during the post-war years. It goes without saying, therefore, that keeping operating expenses to a minimum, and reducing them whenever commensurate with good customer service, are inherent responsibilities of everyone in the industry.

The manager of credit and collections for a public utility company occupies a unique position in the credit world. His company sells its products on credit—there are no cash sales. His company sells to everyone, whether the credit risk is good, bad, or indifferent, and when the time comes to collect for payment, the product is all used and cannot be repossessed. We all know that the people who cause the most trouble in collecting gas or electric bills couldn't get on the books of the average merchant. Certain offsetting safeguards are provided, it is true, but these must be used with great discretion.

Collections in the Future

During the last half-dozen years most companies have gotten by with less credit and collection personnel because of the high level of general economic conditions throughout the country. Uncollectible loss ratios have been the lowest in years. However, when economic conditions decline and money becomes tighter, collection costs will increase at the very time when our companies can least afford the added expense. Top management then will ask, "How Come?"

At the outset, let us agree on the three principal elements of collection expenses, each one of which is closely related to the other two. The first of these elements is the cost of surety deposits, including the review of service orders, clerical and field effort expended in collecting and recording deposits, annual interest charges, and deposit bookkeeping operations. The second element is the net amount uncollectible accounts charged off each year. The third comprises all of the clerical work, routines and procedures, postage, credit history operations, and field collection efforts.

Surety Deposits

The costs relating to surety deposits depend upon the credit policy of the individual company, within the limits of various statutory and regulatory requirements. So many thousands of words have been spoken and written on this subject that we only touch upon it here and a separate study is being undertaken on the subject of surety deposits by another Project Committee.

Some utilities require a deposit from every customer, and hold it until the account is closed. Others have gone the other way and require no surety deposits from residential customers. Perhaps a liberal policy somewhere between these two extremes is best, coupled with *voluntary refunding* of deposits to those customers who have established a good or fair paying record after a specified period of time.

If we had a crystal ball in which we could forsee the financial future of each customer, we would secure adequate deposits on only those accounts which eventually would be charged off, and thereby eliminate our uncollectible losses. But even without a crystal ball, the credit men of companies with a large proportion of secured accounts can calculate the annual interest cost of the total amount of deposits on hand, and can add to this cost the deposit bookkeeping expenses for a year. Even though deposits on hand may, to some extent, offset working capital requirements, the total net cost of surety deposits might be surprising. The trend in the industry seems to be toward reducing deposit balances and their attendant expenses. Cost savings, however, is but one factor in deciding upon a deposit policy. A liberal policy undoubtedly contributes to improved customer relations. The offsetting consideration is the extent to which uncollectible losses may increase when fewer accounts are secured.

Uncollectible Losses

Uncollectible losses — the gross amount of charge-offs less recoveries —are likewise a direct responsibility of ours. The net uncollectible loss is one of the measures of the effectivness of credit operations and related collection action. We all know that the exceptionally low amount of net losses during the past several years is due to steady employment and high wages. Too many of us can remember the difficult days of the early thirties when exerting a great deal of collection effort seemed like throwing good money after bad—people just didn't have the cash. None of us is willing to predict when economic conditions again will require increased collection effort, but every utility credit man has his finger on the economic pulse of the community because the effectiveness of his work is most frequently measured by his record of uncollectible losses.

Collection Expense

This brings us to the third and most flexible element—collection action. It is this phase of the business that we can scrutinize most closely and for which we can make future plans. I would like to discuss briefly two methods of approach, the first of which concerns methods and routines.

While the volume of collection operations is still lower than normal it might be well to comb over office routines, collection procedures, notice forms, history records, and all clerical

operations. Why not examine what has been done in the past, and see if there might not be an easier, better, or cheaper way? Examine an operation or a routine and ask yourself—or your supervisor—"Why are we doing it this way?" There are many corners that can be cut. Any one improvement, multiplied by thousands of repetitive operations, may add up to a real saving.

It is difficult to make any specific suggestions because the size, methods, and local conditions vary so widely among individual companies. A few examples, however, will serve to illustrate the point.

Standard Reminder Notices

A number of companies have effected a substantial savings in clerical effort and postage by using a standard "friendly reminder" notice to good or fair paying customers. These notices are all generally alike in that they do not carry the customer's name and address nor the delinquent amount. Such notices may be mailed in open-end envelopes for 1¢ each instead of 3¢, when the quantity is sufficient to meet postal regulations.

Reducing Volume of Reminder Notices

Several companies have gone even further and have discontinued sending reminder notices on chronic or habitually delinquent accounts. Tabulations of results have indicated that a "friendly reminder" has no appreciable effect upon this type of customer. Such people are so used to receiving notices that they recognize the envelope and don't even open it. Companies which have abandoned reminder notices on this type of account have not experienced any adverse customer reaction and have accomplished savings in time, labor and postage.

Obtaining Credit Information by Postal Card

When insufficient credit information has been secured at the time of application for service, some companies write individual letters, or make telephone calls, or even field calls at the customers' premises. It has been found that a carefully designed two-way postal card will bring in the desired information in many instances, at considerably less cost. It is true that a postal card is impersonal; on the other hand, such a card provides an easy way for the customer to comply with the company's request.

Selection of Delinquent Accounts for Collection Action

There are some utilities which still crank out a collection notice on every delinquent account, within certain prescribed limits as to amount and period of time, regardless of the individual customer's paying habits. Not only is this expensive, but it may definitely impair customer relations. Some people prefer to pay their bills bi-monthly or even quarterly, regardless of discount or penalty. There is absolutely no point in sending such a customer a series of delinquent notices, because he will not pay any attention to them except with the result of becoming mad at the company. Considerable savings in clerical costs, stationery and postage—as well as wear and tear on the nerves of customers—may be effected by applying some sort of credit code to delinquent accounts. This will separate the sheep from the goats, so that collection action may be exercised only on those who deserve it.

Now is the Time to Make Changes

Charles E. (Boss) Kettering may be remembered longer for his philosophy than for his many inventions and contributions to science. He once said, "Anything new is perfectly all right as long as it is no different from the old way of doing it." The statement is all too true. Mankind has a habit of getting into a rut, even though it may be an unhealthy one.

We are in a changing world. We cannot afford to become atrophied in our thinking and expect to keep abreast of the times. Many changes were made during the war which were necessitated by shortages of manpower, automobiles, gasoline and tires. Some of those changes will be maintained, being justified by substantial cost reductions. Others will be rescinded where company management feels their continuance may harm customer relations. However, the time is still propitious for credit and collection men to make desirable changes while unpaid arrears are at an all-time low and when the fewest number of customers will be affected.

Why Have Field Collectors?

This brings me to the second approach to the problem of reducing collection expenses, and to the crux of my subject. The question "Why?" often brings surprising answers. Let me ask: *"Why send a man to a customer's home or place of business to collect money in payment of a delinquent utility bill or a surety deposit?"*

During the past several years, I have asked that question of numerous utility credit and collection men. The answer is almost invariably: "We have always used collectors, and so has everybody else in the electric and gas business." Upon pressing the idea that field collection is an unnecessary operation and a practice which is costly to the company, the immediate response is usually: "You can't change now, because the customers wouldn't stand for it!" I shall undertake to prove to you that field collectors are *not* necessary, and that a change from the present general practice can be made *in these times* without adversely affecting customer relations.

Pre-war and Present Collection Volume

Most collection men have kept daily records of statistics over a period of years, and it is pertinent to compare present operations with normal or prewar collection effort.

Suppose we assume as normal the 5 prewar years, 1936 through 1940 inclusive, for the purpose of comparing your own company's operations with Union Electric in the city of St. Louis. We were then using *one field collector* per 11,000 accounts on our books; and were mailing disconnect notices to approximately 10 per cent of our customers. About one-fourth of these accounts were paid before the date scheduled for field call, and the remainder were assigned to collectors. Analysis showed that a consistent 50 per cent of the customers called upon paid the collector; 34 per cent were granted extensions of time; and in 16 per cent of the cases we found it necessary to disconnect service as a last resort.

Collectors Receive Payment on Half Their Calls

Comparable figures for the year 1946 showed that we were exercising collection action on only about one-third as many accounts as we had before the war; but our collectors were still *receiving payment on over half of the accounts* assigned to them in the field.

A written notice threatening disconnection of electric or gas service is serious. A household cannot live in comfort without these necessities, and their importance to a business concern

is even more vital. The first step, therefore, was to find out why over half of the customers visited (following a cut-off notice) paid the delinquent amount to the collector. We found that the great majority of these collectors' calls were simply "accommodation" calls. In some instances, the collector was met at the door by a housewife with her hat and gloves on and her purse under her arm—obviously dressed to go out. This was her greeting, "Why are you late? You are usually here by 10 o'clock and here it is after 11 and I have a luncheon engagement!" Very frequently, people ignored our 5 per cent prompt payment discount and preferred to wait for the collector to call because they had no bank account and it would require two bus fares for a trip to the nearest company office to pay their bill. Some people without bank accounts did not know where a money order could be purchased. Others actually did not know that bills could be paid by mail.

At this point we began to see that considerable sums had been spent for many years in collectors' salaries and automobile expense to furnish a door-to-door collection service to a very minor portion of our customers.

Three Convenient Ways to Pay Bills

If we did not have field collectors, how would these people pay their bills? Most progressive utilities provide three ways, any one of which the customer may select at his own convenience. Fast and efficient service is usually rendered at the company's main office or its branch offices, where any bill may be paid at any time. Likewise, most companies blanket the area they serve with pay stations where customers may pay current bills within the discount or penalty period, and in some territories such pay stations are even permitted to accept partial payments or bills past due. The third method of payment is by mail. While a large proportion of people do not have bank checking accounts, payment may still be made by mail with postal money orders or cashier's checks. In addition to post offices, many merchants do a side business in money orders, and all banks sell cashier's checks for small fees. We were surprised to find that there are over 600 such agencies in the St. Louis area, or 1 per 600 customers.

When it was found that 50 per cent of the customers we called upon had the money to pay their utility bills but chose to wait for the field collector to call, it seemed that a proper educational campaign would persuade these people to pay their bills by any of the other three methods provided, *and at their own convenience.*

Educational Job Required

There is no doubt that this *selling job* can be done adequately and without any adverse effect whatever on customer relations. It should be pointed out to each customer that a collector's call is not necessarily convenient to him because we call at a time selected by the company; whereas the customer himself can choose the most convenient method of payment as well as the most convenient time for payment under any of the three alternatives just cited. Then, too, there is a very forceful appeal to fairmindedness, because most American people are agreeable to anything that is fair and square, but they violently oppose anything that is unjustly discriminatory. It can be explained that calls are being made on only about two per cent of the company's total number of customers, and that it would be unfair to expect the company to call on every one of its customers every month to collect his electric or gas bill.

So much for the large proportion of our collectors' calls which, for lack of a better word, we might term "accommodation" calls. These people could have paid their bills anyway, but waited for us to send a man out to get their money. Let us now examine the borderline cases and the chronic delinquents.

For over 10 years, Union Electric credit men have begun collection action under a selective method whereby only those accounts are followed which appear to merit such attention. Fair paying customers and occasional delinquents are passed up altogether.

The habitual delinquents and troublesome accounts will usually establish themselves on the company records. These are the people on whom no amount of preliminary action has any effect, and disconnection of service is the only remedy of the situation without incurring the chance of increasing losses. These "we will always have with us," and are not pertinent to the proposed change in procedure.

This leaves the remaining group of borderline cases which must be accorded careful treatment. The educational campaign must also be accorded these people; and, in our territory, they comprise about 40 per cent of the total calls assigned to the field.

On March 1, 1947, our company discontinued accepting delinquent payments at customers' premises in East St. Louis and Alton, Illinois, where we serve about 50,000 customers. On May 7, 1947, we discontinued field collections in the City of St. Louis, where we serve about 250,000 customers. This action was taken without public announcement, because of the very small number of customers affected; but amended rules were filed with the regulatory commissions in both Illinois and Missouri.

Putting New Procedure Into Effect

An intensive training course was given our collectors in advance, emphasizing the selling job that these field men had to do. An instruction booklet entitled, "The Why of Union Electric Collection Procedure" was provided all customer-contact employes, including meter readers, troublemen, service clerks and tellers. Every employe of the credit and collection department was thoroughly indoctrinated with the reasons for the new procedure, so that any question by any customer could be adequately answered. Most people will accept a change in policy if they understand why the change is being made.

For the first six months of the changeover period, our field men were extremely liberal in granting extensions of time. We never disconnect any customer on the first call, which is made primarily to explain that we no longer collect delinquent bills. If the money is offered, we allow from two days to a week for the customer to get the money in to one of our offices, either in person or by mail. If he doesn't have a bank account, our representative furnishes the addresses of the nearest places which sell money orders. At the same time, he explains the discount which can be saved by prompt payment, and gives the addresses of the nearest pay stations where future bills may be paid within the discount period.

After this first informative call is made, an appropriate credit code is made on the customer's record. This is

transcribed to each subsequent delinquent notice, so that the field man may be guided thereby. As is customary with most utilities, our field men have considerable latitude in exercising discretion whether to grant a further extension or to disconnect service. In doubtful cases, he may telephone the credit department for final approval, particularly on commercial accounts. In addition, his field order is coded to indicate the past paying record of the customer, the length of service at the present address, how many months the account is in arrears, and whether or not there is a surety deposit or guarantor. Thus he is equipped with much pertinent information about each delinquent account on his route.

As might be expected, it was necessary to make a good many repeat calls on the periodically delinquent accounts until the customers became convinced that past due bills must be paid to a company office. The number of actual disconnects increased for a few months on the lower borderline cases, but these have since dropped back to about the normal volume before the procedure was changed.

If service should be disconnected where no one is at home after several calls, our troublemen are authorized to reconnect service in emergency cases, without receiving payment of the past due amount. The foreman on duty approves each such instance, following up with a report to the collection department the next day. Such cases, however, are very infrequent.

In continuing the new policy, we make at least one informative call in every case where we have not previously made a verbal or written explanation. Our time extension after this first call is very liberal. This first explanatory call will have to be made as long as some customers become delinquent and have never been followed up before, and as long as people move into our territory from places where they are used to paying delinquent bills to a collector.

Effect on Volume of Field Operations

After 9 months of operation under the new policy the number of field calls has been reduced by approximately 50 per cent. The number of field men has not been reduced quite that much, because of the greater distances to be travelled with fewer calls per route. We are now operating effectively with a force of 6 credit representatives (they are "collectors" no longer) for 350,000 customers in St. Louis City and suburban St. Louis County, which covers a total area of 578 square miles.

Reduction In Collecting Costs

What does this mean in costs? The wages of collectors in our Company have gone up over 75 per cent since January 1, 1941, and that ratio of increase may not be far out of line with the experience of utilities throughout the country. We are now operating with 1 field man per 60,000 customers. Even under prewar economic conditions, we believe the same territory could be covered adequately by 10 men, or 1 field man per 35,000 customers.

But if we were operating our old policy under prewar economic conditions (one collector per 11,000 customers), it is conservatively estimated that 30 men would be required to cover the same territory. This means that if we accept payment of delinquent accounts on customers' premises, in normal times it would take *three times as many field men* and more automobiles than under a "no-collection" policy.

Therefore, the potential savings under the new method, even after allowing for increased automobile expense because of longer routes, is equivalent in our company to *about 17¢ per year for every customer on our lines.* Adjustment for wage rates and local conditions would have to be made, of course, before making comparisons for a similar operation in any other utility company.

We all know the importance of credit and collection policies to good customer relations. Perhaps no phase of our business can have a quicker or more harmful effect on the public than poorly administered credit practices. It would be foolhardy to suggest anything that might impair our relations with the people who buy our service.

The "no-collection" idea is not nearly as tough as it sounds. Most of the people we call upon have not paid their bill for two months or more; the 10-day prompt payment period has expired; another week has passed before notices were mailed; and still another week or more is allowed for payment before the field man calls. In other words, there has been plenty of time if the customer really wanted to pay the bill.

Our field operations have been carefully supervised throughout this transition period. Brief meetings were held of all field men and supervisors daily at first, and then weekly. Experiences were exchanged, and it was found these soon fell into a pattern. Many customers said they always thought it was kind of funny (or "silly") for a big company like ours to send men around just to collect small utility bills. A very frequent excuse people gave was that they were too busy to pay the bill and always missed the discount. Many customers asked about the location of an authorized pay station, although the nearest ones are listed on the back of each monthly bill. Quite a few said they always waited for the collector because they believed it meant something to him—apparently these people thought collectors worked on a commission basis. The general reaction of the great majority of customers seems to be a greater respect for the company for following a sound business practice.

Our preliminary study and planning required several months before making the change. After making over 30,000 calls and some 5,000 disconnects during the first nine months under the new policy, there has not been a single complaint to either state commission, or to a company executive, or even a departmental supervisor. A further check was made by surveying a scattered cross section of customers who had to pay their delinquent bills to a company office, and we found acceptance of the change gratifying beyond our fondest expectations.

Delinquent Accounts

In conclusion, the policy of not collecting delinquent electric and gas accounts in the field is not absolutely new. There are a very few scattered companies which have followed this practice for many years. Likewise, it is not the general practice of the Telephone Company to collect delinquent bills at customers' premises. Some municipal as well as some privately-owned water companies also do not make field collections.

The great bugbear to most credit managers in the gas and electric business seems to be the fear of making

(*Continued on page* 164)

Customer Information Manuals

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An address presented before the National Conference of Gas and Electric Utility Accountants, held at St. Louis, Mo., on April 12, 1948

A SCHOOLBOY once defined a public utility as "A company that sells gas, water and electricity, and which if you don't pay your bill they come and take your telephone out."

Fortunately, young people today have a better opportunity to learn the practical aspects of utility operation than was available to their elders. Radio television, jet propulsion and the atom bomb have stimulated unprecedented interest in applied science. As a result, meters, fuses and even plant and distribution processes fall within easy range of youthful comprehension.

Information Now

But until these new and wiser generations show up in greater numbers on our customer ledgers, we are still troubled with complaints, service calls, explanations and adjustments which might be avoided (or at least reduced materially) were our customers better informed.

Both as a preventive and as a curative measure, many utilities publish booklets, pamphlets, envelope stuffers and other literature designed to explain those phases of utility operation which most frequently cause misunderstanding and dissatisfaction. The performance of these publications in the field has been watched with considerable interest by companies who recognize the need for a customer information program. Particularly interesting is the comprehensive booklet or manual which generally covers many more subjects than can be included in the smaller folders or stuffers.

For those who plan to publish such a booklet or who expect to revise existing publications, your committee presents this discussion of current practice . . . commenting specifically on the content, production, distribution and effectiveness of Customer Information Manuals.

Of the 120 E.E.I. and A.G.A. member companies questioned on the subject of customer manuals, more than 60 had replied up to the time this paper was prepared. Twenty of these are now distributing some form of manual and furnished the committee with copies of their publications together with information regarding their distribution, production and effectiveness. It is significant to note that only *one* company reported that it had discontinued its manual because it was not effective. The manual was discontinued 20 years ago, for reasons which will be quoted later.

In addition to the many booklets received in response to the committee's questionnaire, others were obtained from other sources, bringing to 40 the total number studied in preparation for this discussion.

Local Problems

Each company that publishes a customer information manual naturally tries to answer most completely those questions which constitute the most troublesome local problem. For example, the Florida Power and Light Co. devoted an entire 16-page booklet to the critical househeating problem in Florida. Only four other booklets mention the subject at all. Seventeen booklets explain meter reading in considerable detail, but one company dismisses the subject with the following sentence:

> "Some customers like to read their own meters at the time the meter reader calls to make his record, and if you would like for someone to show you how this is done, please call Home Service Department, F. 2121."

Although the amount of attention devoted to each subject varies with local conditions, most of the subjects covered in the 40 manuals examined are common to nearly all gas and electric companies. These topics, 47 in number, range from the "institutional" message to the brief passage which says there's a law against letting your dog bite the meter reader.

Manual Topics

The following topics appear most frequently: Institutional Message, 18 times; How to Read Your Meter, 17 times; How to Figure Your Bill, 13 times; Why Bills Vary, 12 times; How to Change Fuses, 11 times; What to Do When the Lights Go Out, 10 times; How Much Does it Cost to Operate Various Electrical Appliances, 9 times. Of the 47 subjects covered by the 40 manuals, no other single subject appears more than 8 times. A complete list of subjects is appended to this paper.

It can be seen from the foregoing tabulation that the typical customer information manual sets out to accomplish two main objectives:

1. To build good will by helping the customer *understand* the utility's importance to home and community life (institutional message).
2. To forestall complaints by helping the customer to *understand* those elements of company operation with which he comes in contact in his home, i.e., meter, bills, fuses and appliances.

However, you alone can determine what should go into your booklet and how to distribute its weight. In one utility the question of public vs. private ownership has come up five times

in recent years; enough to be a nuisance if not actually a serious problem. Yet the utility's new booklet devotes only two brief paragraphs to the question. It should be added, however, that those two paragraphs are clear and convincing.

Customer Information Manuals attempt to sell an idea, a service, and in many cases, merchandise. They set out to do an *advertising job,* therefore they must be measured by advertising standards. An elementary advertising yardstick is the formula: Attention, plus Interest, plus Desire, plus Action . . . equals Results. The formula is easily remembered by recalling the word AIDA . . . A-I-D-A. For our purpose, Attention, plus Interest, plus *Understanding* fits the picture better.

Command Attention

There is no reason to believe that a customer is more eager to read advertising in booklet form than he is to read advertising in any other form. The booklet, like the newspaper or magazine ad, first must command attention before it stands a chance of being read. If sent to the customer by mail it must compete with other advertising literature. If it is placed on the salesfloor in a rack or on a table it must compete with merchandise displays, floor decorations or literature put out by appliance manufacturers.

Certain attention-getting devices are very much in evidence in many of the manuals observed.

Brilliant covers are favored by the newer publications, and the trend is to solid backgrounds of yellow, red. blue, and green . . . all high-visibility colors. Many good cover illustrations also help attract attention.

An attractive, eye-catching cover, however, is of little use unless the booklet is opened and read. We will assume that a customer at least will thumb through a booklet if it is handed to him in person. But suppose he receives it through the mail or sees it at the information desk on the sales floor . . . does its *title* provoke his curiosity or in some other way invite him to look inside? Here are a few typical titles now in use:

(a) Your Electric Service
(b) Electric Service Information
(c) Your Gas Meter
(d) House Heating
(e) Gas and Electric Service in the Home

Not one of these titles says anything in particular . . . nor does it issue an invitation to look beyond the cover page.

Compare them in interest value with the following titles:

(a) The Bus That Came for Breakfast
(b) Meet Your Meters
(c) How To Save Money on House Heating
(d) Now That You Live Here

These titles pique the curiosity . . . leave something unsaid . . . invite the reader to look inside and find the answer. It is a principle that is followed by top-flight advertising agencies who spend millions of their clients' dollars and whose ideas must, above all else, ring the cash register. Consider these headlines taken from ads appearing in a popular magazine:

(a) This Car is Running with an "EMPTY" Gas Tank
(b) Do You Want to Ship a Tiger?
(c) A Billion Dollar Investment is Not Enough
(d) Are Americans Wiser than Chinese?

Because these headlines do not betray what is to follow, the reader must go deeper into the advertisement to satisfy his curiosity. Many utilities have followed this example to provoke greater readership of their manuals. You may want to follow their example and do the few minutes of extra thinking it requires to produce a title that will do this job well . . . always bearing in mind, however, that a clever title must be logically supported as soon as possible on the inside pages; otherwise, the customer will feel that he has been tricked and will resent the subterfuge.

Booklet Size

A wide variety of sizes is observed among the booklets examined, but the 5½"×8½" size is favored by more companies than all other sizes combined. This is approximately the same width and depth as the average novel or cook book and, therefore, can easily be kept on a book shelf for ready reference. The Pacific Gas and Electric Co. goes a step further and has punched a hole in the upper left hand corner (in the manner of a small telephone directory) so the manual can be hung alongside the meter or fuse box or perhaps behind the kitchen or closet door.

Following the "ready-reference" idea still further, some companies have marginal index tabs which aid the customer in quickly locating needed information. Two examples are The Ohio Fuel Gas Co. and the Washington (D. C.) Gas Light Company.

Another important factor which helps determine the amount of attention a manual receives is its method of distribution. Six campanies report that their manuals are distributed by mail only. Three report mailing *plus* distribution by service clerks. Seven report distribution by field and office representatives only. One reports home service distribution, one reports meter reader delivery, and two report various methods such as through sales and exhibit contacts.

Distribution Coverage

The returns on this question were not high enough to provide conclusive data on the distribution problem. However, it is interesting to note that the only two companies which reported 100 percent customer coverage mailed their manuals. The next highest coverage, 90 percent, was achieved by meter reader delivery. One company reported 60 percent coverage; another, 35 percent, but from that point coverage dropped to an average of about 5 percent.

Many companies distribute manuals only to new customers either by mail or at the time application is made for service. This incidentally, accounts for the low percentage of customer coverage reported in many instances. The Wisconsin Electric Power Co. employs a "uni-mailer" which assures the simultaneous arrival of a letter of welcome (carrying first-class postage) along with a colorful folder describing the utility's services and facilities.

So far, we have seen what efforts have been made to *attract the customers' attention* to information manuals . . . by use of color, provocative titles, convenient size and effective methods of distribution.

The next step is to hold the reader's *interest* long enough to get your story across. This is a job for layout, typography, illustrations, and of course, well-written subject matter.

The keynote of interest is action. Many pamphlets, especially the newer ones, achieve this by liberal use of illustration, cartoons, diagrams and photographs. Reddy Kilowatt livens

up the pages of nearly all electric service manuals.

The use of adequate illustration is especially important in meter reading and fuse changing instructions. Many booklets have done a remarkable job in making these processes understandable to the average customer. The Baltimore Gas and Electric Co., the Pacific Gas and Electric Co., Commonwealth Edison and the Indianapolis Power and Light Co. have done especially well on meter reading instructions. The Union Electric Co. and the New York Power and Light Co. are good examples to study on the subject of fuse changing. Union Electric makes use of large photographs which require only a minimum of written explanation. It follows the same pattern that has built *Life* Magazine into one of America's most widely read publications. People like to look at pictures; they don't like to read pages of type unless those pages contain more stimulating material than is likely to be found in a utility manual. Fortunately, in the booklets examined, there is a noticeable trend to more illustrations and fewer words. There are still a few booklets, however, which are so tightly packed with words that it is a real chore to dig out the useful information. Like Alice in Wonderland, the customer may find it easier to go to sleep than to wade through a book without "pictures or conversation."

Readability

Closely associated with interesting layout is the clarity, the simplicity . . . the readability of subject matter. The manual is of no use unless the customer *understands* what he is reading.

Some companies make it a practice to test their explanations on a few customers before printing the manual. If the explanation is hard to understand and can't be simplified further, it probably is better to leave it out altogether. Apparently the subject of meter testing belongs in that category, as only one manual out of 40 attempts to explain it.

Writing from the customer's viewpoint, the Consumers Power Co. explains "five easy steps to take when you figure your gas bill," and takes only 100 simple words to do it.

1. First Step . . . 75¢—The minimum charge per customer, or individual apartment is 75¢ net per month which covers the first 300 cubic feet of gas used.
2. Second Step . . . 15¼¢—The next 700 cubic feet cost only 15¼¢ per hundred cubic feet.
3. Third Step . . . 10¢—The next 2,000 feet come at 10¢ per hundred cubic feet.
4. Fourth Step . . . 8¢—The more gas you use, the cheaper the rate. For the next 7,000 cubic feet the charge is 8¢ per hundred cubic feet.
5. Fifth Step . . . 6¢—When you reach the fifth step, you have used 10,000 cubic feet. For all gas in excess of this amount the charge is only 6¢ per hundered cubic feet.

To make it still easier on the customer, 12 little check-off slips are attached to the page which can be used to figure each month's bill for comparison with the company's statement.

Writing *for* the Customer

Not too many years ago manuals, as a rule, were written neither *to* the customer nor *for* the customer . . . they were written *at* him. If he didn't understand what he read, that was his fault. But now the radio, the movies and the *Reader's Digest* give him his news, his education and his entertainment in *clear, easily digested form.* His information comes easily from *most* sources, so he expects it to come easily from *all* sources. Most companies who have published manuals within the past 10 years or so recognize this transition . . . and have made their manuals not only clear, concise and readable . . . but in many cases even breezy and entertaining.

It should be remarked, in passing, that the electric industry owes a tremendous debt of gratitude to that flashing red gremlin, Reddy Kilowatt, who prances through the pages doing many things wonderfully well . . . but whose greatest contribution to customer manuals is his ability to tell his story in first person, using language his audience can understand.

A manual that is easily read and easily understood by the customer is likely to carry conviction. If the customer is convinced, chances are he will be *cooperative* . . . and that is exactly what a customer information manual sets out to accomplish.

Layout, illustration and the final drafting of the subject matter (or copy) are jobs for the advertising department or for an advertising agent. All 20 utilities who are now using manuals reported this procedure. It is assumed of course that first drafts of the text were prepared by sales, accounting, meter and other interested departments.

Editing the Manual

Unfortunately, professional advertising service is not always available. Some companies must rely on local printers or engravers to take pages of text submitted by the various departments and "dress it up." Sometimes this works out well insofar as art, layout and typography are concerned but usually what you send them in the way of textual matter is exactly what you'll get back in printed form. Lacking the services of a skilled copywriter, a study of manuals published by companies who *have* had this advantage will be of great assistance to the person or persons who are given the responsibility of *editing* the manual.

In attempting to cover all possible phases of activity which might influence the effectiveness of Customer Information Manuals, the following question was asked of member companies: "Do you make any *special* effort to acquaint employees with the contents of your manual and its objectives?" Most companies replied that employees do receive a copy of the manual (which is no more than fair) but only two reported special efforts. In both cases, the company conducted classes for employees. This would seem to be a highly commendable procedure for two reasons:

1. Personnel studies reveal that, other factors being equal, efficiency and job satisfaction are at their highest level among employees who show the greatest understanding of their company's problems and practices.
2. In the eyes of his friends and neighbors *any* utility employee is fair game for questions about *all phases* of utility operation. A thorough knowledge of the manual will permit him to represent his company to better advantage and therefore will supplement the educational job the manual has set out to accomplish.

It is unfortunate that employee-education programs so often are lim-

ited to customer-contact personnel . . . for actually, *every* employee represents the company in his own neighborhood and *could* perform a worthwhile good-will function.

Having discussed the experiences of many utilities with regard to plans, production and distribution of customer information manuals, the question remains: "How effective are these manuals in improving customer relations?"

Here are a few replies which reflect the consensus on this question:

(a) "We feel it has been valuable and no doubt has been a factor in the success of our recent franchise elections."

(b) "Very effective because we believe it has reduced the number of service calls."

(c) "Can't tell . . . has helped special problems."

(d) "Our customer relations, as shown by continued surveys, is improving, so in a general way we would say that these activities have been worthwhile."

(e) "It is one additional contact."

(f) "We have no tangible information that they (the booklets) actually did any good, but on the other hand, they must have acquainted some of our customers with our practices and procedures."

Apparently everyone who now publishes a manual believes that it is doing a worthwhile job for the company, but your committee did receive *one* letter which said:

> "About twenty years ago this company prepared a customer information manual in which we tried to explain the company's bills, collection policies, the way to read a meter, the way to replace a fuse, the care and repair of appliances, and other matters it seemed desirable the customer should know. The distribution of this pamphlet was discontinued, however, when it became apparent to us that most customers threw it into the waste basket without reading it or at least discarded it shortly thereafter so that the information contained was not available to them for reference when required."

Because no one wants *his* manual to suffer a similar fate, your committee has tried to analyze current practice and to point out the factors which have helped produce *successful* manuals . . . factors which can be summed up in the formula: Attention, plus Interest, plus Understanding, equals Results!

APPENDIX—DIGEST OF CONTENTS OF INFORMATION MANUALS REVIEWED

Number of Booklets Covering	*Subject*
18	Institutional (contribution to community life)
	Electrical service
13	(a) how to read meter
1	(b) how to test meter
8	(c) how to figure your bill
12	Why electric and gas bills vary
11	Changing fuses
10	What to do when lights go out
	Know your gas meter
1	(a) how it operates
4	(b) how to read it
3	(c) how to figure bill
2	(d) averaged bills
9	How much does it cost to operate various electrical appliances
8	Application for service connection, transfer or discontinuance
7	Care of appliances
7	Appliance service facilities
7	Home service facilities
6	Low cost of electrical and gas service
6	Wiring plans
5	Table of contents
5	Description of kilowatts
5	Home lighting
5	Gas water heater operation and use
4	Meter accuracy checks and tests
4	Maps of areas served
4	House heating (gas) and air conditioning
3	Thermostats
3	Cheap electricity for the farm
3	Telephone directory for service
3	Saving electricity or gas
3	Gas range operation
2	Recipes
2	Gas refrigerator operation
2	Line extensions
2	Kitchen Planning
2	Pay stations (branch office locations)
2	Special problem (house heating in Florida) local option, etc.
2	Household hints
2	Identification of employees
1	Tips on spring and summer house cleaning
1	New ideas in electrical gadgets and services
1	Calendar of events for coming season
1	Dictionary of electrical terms
1	Office hours
1	Comparison of electric rates in various parts of the country
1	Burglar Protection
1	Street lighting
1	How to exchange light bulbs (company service)
1	Complaints and suggestions
1	Have you a dog?
1	What does your neighbor plan to do?
1	Radio programs
1	High School football schedule (monthly publication)

Television Committee Organized by E.E.I.

TELEVISION and the effects that its widespread use will have upon the nation's electric utility companies will be studied by a new committee that has just been organized in the E.E.I.'s Commercial Division, the Institute has announced.

With Frank C. Pesveyc, Sales Promotion Manager of the Public Service Electric & Gas Company, Newark, N. J., serving as Chairman, the Committee of utility sales executives has formulated plans for intensive analysis of several phases of television.

Each Committee member, Mr. Pesveyc said, will arrange to have recording meters connected to television sets now in use in his company's area, to determine the actual average load of each set. Members will also examine the service bills of television users for the year preceding and the year following installation, in an endeavor to calculate the net average additional load resulting from each set that is installed.

The personnel of the Television Committee, in addition to Mr. Pesveyc, include: L. L. Bond, Virginia Electric & Power Co., Richmond, Va.; Thomas J. Collins, Consolidated Edison Co. of N. Y., Inc., New York, N. Y.; J. R. David, Cleveland Electric Illuminating Co., Cleveland, Ohio; Joseph M. Garvey, Consolidated Gas, Electric Light & Power Co., Baltimore, Md.; Edwin O. George, The Detroit Edison Co., Detroit, Mich.; Lloyd R. Leslie, Delaware Power & Light Co., Wilmington, Del.; H. C. Rice, Southern California Edison Co., Los Angeles, Cal.; E. W. Seese, Philadelphia Electric Co., Phila., Pa.

Use of Judgment in Estimating Life Characteristics of Depreciable Property

By George T. Logan
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and Charles T. Dwight
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An address presented before the National Conference of Gas and Electric Utility Accountants held at St. Louis, Mo., on April 14, 1948

THIS paper does not pretend to cover or even touch upon the merits of accruing the cost of inevitable property retirements through the use of detailed service-life estimates versus other methods in use. Many utility managements believe such estimates to be at best useless and at most misleading as a basis for depreciation accruals. On the other hand, study and research into the question is a useful thing, and certainly we would be the first to welcome the addition of a generous portion of judgment to the raw facts poured into the hopper of a machine designed to grind out service-life estimates.

Available Data

For those who may be unfamiliar with the fact, the cooperating Committee on Depreciation of the American Gas Association and the Edison Electric Institute published a report in 1942 entitled, "An Appraisal of Methods for Estimating Service Lives of Utility Properties." This report deals with the various statistical methods for analyzing past experience for the purpose of estimating average lives and types of dispersion. It is now being revised in the light of the most recent techniques.

The proponents of these various methods do not rule out the use of judgment. They expect it to be used in the correction of raw data, in the selective use of various factors such as the choice of bands of years when the property was placed in service, and in balancing the value of small samples of recent experience against larger samples of much older experience.

Various mathematical and graphical corrections would be applied to smooth out results. Most of these methods have merit and are useful and necessary tools in arriving at an estimate. But they all have one fundamental feature in common. They are statistical procedures based on the assumption that the past is going to repeat itself. They contain no element of forecast, although it is necessary to translate past experience into terms of future probabilities.

The great bulk of utility property is retired, not because it is worn out, but because it has become obsolete or inadequate. For this reason there is ordinarily no compelling reason why current or future experience should repeat the past; in fact, there are ordinarily sound reasons why some departure from past experience should be anticipated.

In this, our problem is different from that of life insurance companies who are able to accurately predict average human mortality on the basis of statistics for the entire country. They are dealing with one homogenous item whose life characteristics have remained pretty much the same from generation to generation. And even the insurance companies have recently discarded the American Experience Mortality Table, in use since 1868, in favor of death experience during the period 1930-1940, because advances in the medical art have prolonged man's life and they have been able to recognize and utilize this trend.

Judgment and Past Experience

In contrast to the sameness of human life, utility property is composed of many unlike items with which we have had little experience for successive generations, and it is not uncommon to discover that past experience provides little or no basis for estimates of average life. Either records are lacking in sufficient amount, or their vagaries indicate statistical unreliability, or they relate to types of plant far different from the existing composition of the plant account, or they reflect non-recurring causes of retirement or phases of development. In such cases, when past experience is lacking or misleading, judgment assumes even greater importance. This paper will first discuss the application of judgment to past experience, and then describe how to apply judgment in predicting the remaining life of property now in service.

Five Main Causes of Depreciation

It is worthwhile to review briefly the five generally recognized main causes of depreciation: Deterioration, Inadequacy, Obsolescence, Casualty, and Requirements of Public Authorities.

Deterioration proceeds naturally with time, and also with use, in more or less consistent fashion and is accumulative with age, except where deterioration is removed or diminished through maintenance. Thus, decay will destroy a wood pole in the course of time if the pole is not previously removed for other causes, because time is an important factor in decay. However, the date of removal can be postponed greatly by treating the pole in place. While improved materials and methods *reduce* the rate of deterioration, they generally do not *prevent* it altogether.

Inadequacy is influenced almost solely by load growth, coupled with the factor of system design and the ability of the system to meet changing load conditions without retiring plant in service. The effect of inadequacy may be illustrated by considering the electric power generator, and assum-

ing (for the illustration alone) that repairs and renewals will eliminate all probability of failures due to deterioration. The production capacity of the generator will not decline with age in this case, so that inadequacy will not exist until it has become a fact by reason of some external factor such as load change. Time, as such, is of no consequence, and inadequacy cannot be accumulative with age because it may affect relatively new plant as well as old.

Obsolescence likewise has no relation to time as such; but is usually related to changes in the art which include improved utilization of plant, as well as improvements in the basic equipment. In electric power production for instance, advances in the art which result in higher production efficiency and lower investment per kilowatt can make plant obsolete without regard to its age at the time.

Casualty is also independent of age, as is apparent from the fact that poles broken off by collision are as likely to be new as to be old. Old and new plant alike are similarly exposed each year to the probability of losses by fire, sleet, flood, etc., and such hazards obviously are not accumulative with time.

Requirements of Public Authorities, or civic improvements, likewise have no respect for the youth or age of facilities that must be changed when occasion arises. Close cooperation with all agencies which plan public improvements helps to minimize the changes incident to such improvements, but even the best engineering foresight cannot completely eliminate retirements of this kind.

Functional vs. Physical Causes

It is evident from the foregoing that deterioration includes all causes of retirements which affect the physical condition of a given item of plant, while the other four causes of retirements (inadequacy, obsolescence, casualty and requirements of public authority) include all factors which affect the *functional or economic relation* between the given item of plant and the community or system in which it is installed. It is also clear that only the *physical* causes proceed more or less uniformly with time, and that the *functional* causes are not accumulative with time—a factor of fundamental importance with respect to any attempt to translate past life experience into estimates of service life for depreciation accounting purposes.

It is necessary always to keep in mind the predominance of functional causes of retirements. In 1941, the Fact Finding Subcommittee of the American Gas Association and the Edison Electric Institute Depreciation Committees issued an interim report on "A Study of the Causes of Retirements of Electric and Gas Properties." This study was based on the retirements between 1928 and 1937 of twenty-nine companies. Of the $349,000,000 of retirements it was found that 72.2 per cent were due to functional causes.

Examples of Changing Functional Depreciation

Consolidations of smaller predecessor companies, load growth and advances in the art have all been responsible for substantial changes during a relatively brief span of time, in the physical characteristics of the typical electric utility plant.

These developments have made it both possible and practical to achieve the economies that result from the use of larger generating stations and substations, larger units in the stations, larger capacities in transmission lines, etc. This increased size, coupled with the better quality built into facilities, makes retirements less likely than when everything was on a smaller scale and in a more primitive state of development. The margins for improved efficiency have usually been reduced materially, a typical example being the reduction in the pounds of coal required to generate one kilowatt-hour from more than 6 pounds in 1902 to about 1 pound in 1946. Further reduction of such magnitude is extremely unlikely. And with the present modernized and large-scale equipment, greater opportunity exists to supplement (by superposed generating units as an example) rather than to retire existing facilities, and it is now more often more economic to build improvements into existing equipment than to scrap it. Life estimates of generating plants based statistically on early retirements (and in general only the early plants have been retired) are therefore highly unrealistic, unless a great deal of judgment is introduced.

Other examples of the effect in the early days of changes in the art and initial rapid growth are:

Changeover from direct current to alternating current

Changeover from arc lamps to incandescent street lighting

Changeover from 2-wire to 3-wire service for residential customers

Changeover from aerial to underground service in densely populated areas

These examples covered a lot of early retirements. But this kind of change is proportionately of much smaller magnitude at the present time.

Changes in Accounting Practices and Physical Composition of Plant Included in Accounts

We must review our plant accounting practices if we are to successfully interpret records of retirements for use in estimating service-life characteristics. Major accounting changes as well as changes which have occurred from time to time in accounting concepts and interpretations will result in material changes in the content and continuity of the basic data available for studies of our past experience.

Effect of Maintenance Expenditures

Maintenance expenditures and the "units of property" have an important bearing on the determination of the depreciation costs and these items are an element that should be recognized in making studies of life characteristics. Charges for substantially the same work may clear to maintenance in some cases and to the depreciation reserve in other cases, depending on particular circumstances. An illustration of this may be found in the case of one company's "Account 354—Poles, Towers and Fixtures" for which the company had the following definition of "units of property":

"Pole (line, guy or grace) with or without all cross arms (guys, anchors, etc.)

Pole platform, complete

Tower

Set of Tower Footings or foundations for one tower"

Under this definition and the related accounting requirements, cross arms and other appurtenances (which are "minor" items) are sometimes replaced on charges to the depreciation reserve and sometimes through main-

tenance, depending on whether or not the replacement is accompanied by replacement of the pole. The pole itself is always a unit of property and its removal usually constitutes a depreciation cost. But even here there is room for variation, for in one case a pole may be removed and replaced on the spot, after cutting off a defective section, and the costs so incurred are cleared through maintenance; while in another case a similar pole may be removed to the pole yard for treatment or trimming before re-use at another location, and these costs are then cleared through the depreciation reserve.

Variations of this nature are a practical necessity which may occur in numerous accounts. Where there are substantial replacements of "minor items" through maintenance (as in the case of cross arms cited above) they may have an appreciable effect in lengthening the accounting life of property. Accordingly, it is essential that a thorough investigation be made of accounting practices as they materially affect life characteristic data.

Complexity of Account

We must also examine the varying composition of the physical things whose aggregate cost are represented by the dollars stated in any particular account. The physical composition of any account is complex. That the simple title of electric plant "Account 359 —Services" can be misleading is revealed by the following breakdown by classes of equipment of this account for one particular company:

	Original Cost	*Percent of Total*
Conductors—aerial	$2,679,000	41
Conductors—underground	1,628,000	24
Conduit	1,953,000	30
Other Items	335,000	5
	$6,595,000	100%

The life expectancy of aerial conductors will undoubtedly be different from that of conduit. If the proportions of the two change materially from one period to another, the service life estimate for the account will change materially. We should therefore apply judgment by combining life experience of the various types of equipment in the present proportion of each type.

Changes in Physical Composition of Plant

Not only do accounts consist of various types of property, but the individual types change radically in character from one period to another. To use a particularly simple example, underground conduit in the early days was made of creosoted wooden duct. With bad soil conditions, the life of such duct would clearly be much shorter than later installed concrete or terra cotta duct. Here again we must see that our estimated service life is not merely the result of past retirements but is a balanced result, taking into consideration the probable life characteristics of each type or vintage, combined in the proper proportion.

Small Samples of Recent Experience versus Larger Samples of Older Experience

We are often forced to rely on small samples of recent experience. However, the use of such samples should be examined very carefully, inasmuch as any results based on such samples can be misleading. In the case of one company, it had been the practice to repair and rebuild meters in the company's meter repair laboratory, the cost being borne by maintenance, and the effect was to greatly prolong the useful life of meters insofar as depreciation charges were concerned. Since 1937 it had been the practice to scrap meters upon their removal for repairs as follows:

1. All meters purchased before 1914
2. Meters purchased during period 1914-27 if the repairs exceeded 70% of original cost, and
3. Meters purchased after 1927 if repairs exceeded 85% of original cost

A somewhat similar schedule was followed in the years before 1937 but with slightly different allowances for repair costs. This policy had the effect of arbitrarily increasing the rate of retirement for older meters, and of greatly decreasing the rate of retirement for meters purchased in the last 25 years, the results of this policy being reflected in the following retirement experience with a-c watthour meters, for the nine-year period 1933-1941.

It will be seen that retirements of the older meters dominated the retirement experience of the recent past

	Purchased Before 1914	*Purchased After 1913*
Average Number of Meters in Service, 1933-41	19,300	731,000
Average Number of Meters retired annually, 1933-41	1,050	1,454
Average Annual Rate of Retirement	5.4%	0.2%

even though these older meters were only a small part of the total number of meters and could therefore have relatively little effect on future retirements.

Most of what has been said has dealt with reasons why statistical studies of plant records and retirements may give estimates of service life which will be far removed from actual future experience. Does that mean that service life estimates are impossible? Not necessarily. What then, can be done?

Translation of Past History to Future

There are at least two steps that can be taken to help bridge the gap between service lives that have been determined mathematically from studies of past and present conditions and a realistic estimate of what the service life is going to be. The first is a study to find out if a trend exists in the life of the property account being considered. As one possibility, this trend could be determined, projected into the future, and used as a factor to modify past life experience. The second is through the use of a method sometimes called the "Life Span Method" and sometimes the "Forecast Method."

Determination of Retirement Trend

Provided there is sufficient "good" data available, and this is rarely the case, there are well-known methods for determining changes in the trend of the life of depreciable property. Such methods have been described in various publications.*

However, it is desirable to examine closely the *reasons* or *factors which* produced past experience, so that it will serve as a guide to the future.

As a check on the significance of re-

* "An Appraisal of Methods for Estimating Service Lives of Utility Properties"—American Gas Association & Edison Electric Institute—1942.

"Life Analysis of Utility Plant for Depreciation Accounting Purposes by the Simulated Plant-Record Method" by A. E. Bauhan.

tirement trends, an analysis possibly may be made for each plant account by classifying retirements in accordance with the previously described causes. The period covered should be recent and should be long enough to assure the development of significant trends. In addition, the period must cover those years when plant growth is small, in order to minimize the effect of growth. The trends will be revealed by plotting the net retirement rate in per cent of plant cost for each of the several causes of retirements separately, and in total, for all causes. These trends should show cumulative retirements for each year to date, cumulative figures being used to include the effect of past experience year by year, and to reveal more clearly the direction of the trend. The trend ratios may be expressed in two ways:

1. Current retirements in percent of current investment, or
2. Current retirements in percent of the investment at some earlier date which should be the earliest year for which suitable investment data are available and which is sufficiently long ago to give some effect to age (which affects deterioration, but not the other causes of retirements) and to minimize the effect of growth.

The foregoing is suggestive of some of the methods of reviewing past experience for the purpose of determining whether there has been a change in the trend to the causes of retirements. It proved to be practical in the case of at least one company.

Judgment Method Necessary for Substantial Portion of Plant

Such plant accounts as Poles, or Meters, are often used to illustrate the various statistical methods of estimating service lives. This is only natural because they are accounts made up of many similar units for which past records are often available in detail. For this and similar property, the use of such methods is recommended provided the raw data has been properly corrected, and established trends have not been neglected, nor impending changes in the art overlooked.

However, in many utility systems there are large elements of property consisting of units or groups of units for which available data is inadequate or where the information or data bearing on the problem does not lend itself to formal statistical analysis. In many cases this type of property predominates.

This may be illustrated by one medium-sized company whose depreciable property is more than one-half steam production plant. The following historical facts will show why some judgment process similar to the Forecast or Life Span Method is necessary for the greater part of its plant.

There are two separately located steam plants. The older and smaller was started in 1904 and received the last additional turbo-generator unit in 1918. In this older plant the first five small turbo-generators installed between 1904 and 1908 were retired at an average age of 13-1/3 years, due in all cases but one to inadequacy. The balance of the units are still in service and have been carrying peak loads during the past six years, on a total of seven hundred days. When not actually carrying peaks they were available for stand-by. Their average age is now thirty-one years. They will be retained for many years for peaking or reserve purposes. Only an engineering and economic study can give any clue to their probable service life —certainly not experience based on the retirement of the first five units.

The newer and larger plant was first put into operation in 1921 and is now receiving what may be its final unit. No major plant unit of any kind, including Structures, Boiler Plant Equipment, Turbo-Generator Units, or Accessory Electric Equipment, has ever been retired except for one experimental unit now being rebuilt to enlarged size and one generator rewound to enlarge the capacity, after only five years of service. Here again, there is no statistical basis for estimating service life, and a judgment method of the forecasting type will have to be employed.

Similarly, it can be shown that substantial elements of Distribution Plant and General Plant do not provide experience from which statistical calculations of estimated service life may be made.

Life Span or Forecast Method of Estimating Service Life

The Life Span or Forecast Method of estimating service life approach consists of two distinct steps:

1. Determination of the present age of specific property units or dollars, and
2. Estimation of the probable date of retirements.

Estimated service life is the sum of present age and forecast expectancy.

Determination of Present Age

The first step in determining the age is to take the various property items in groups by year of installation. There may be many cost entries and successive dates for any one construction job, which may extend over a period of months or perhaps several years for larger jobs. To obtain a dating of these installations on any practical basis, it is necessary to do some averaging of dates or to select some mid-way date that is representative.

Utility property is obviously made up of many dissimilar property items which must be dated and defined in some way to give effect to their relative importance, from an age standpoint. The dollars in plant cost representing the various items, should be adopted as a common basis for measuring the age of properties of unlike characteristics. The dating process involves a dating of the physical property by year of installation, expressed in terms of the dollar cost associated with the respective items, and the summations of the dollars times years are used in obtaining the composite ages for any account.

There are a number of other considerations affecting the development and significance of the age data. First, it is necessary to deal with property by classes, accounts or groups as it is impractical to treat the data in all its detail by individual items. As a result, it is frequently necessary to assume that the installation dates for the group follow the same pattern as the dates for the principal identifiable items in the group, which may be only an approximation of the facts.

Historical records usually do not provide complete information as to the installation dates. Even though continuing property records may have been in use for many years data may be incomplete as to earlier plant installations remaining in service, and as to plant acquired from other companies which may have had no records. Estimates must accordingly be made for substantial portions of property.

There are important classes of property in which it is impossible to identify individual items by year of installation. These include such outside plant items as conductors, mains, services, and various inside plant items such as piping, wiring, switchboard panels and many other accessories. In such cases, it is necessary to estimate dates of installation from available records of the growth of the business and from what other related facts are known regarding the development and extension of the various properties, or to assume that the installation of accessories follows the specific dates of the principal items with which they are associated. There are, of course, certain types of facilities which lend themselves readily to the assignment of specific dates; these include structures and improvements, poles (in some cases), turbo-generators, boilers, pumps, condensors, power transformers, and various other principal items for which the age data are fairly precise; but this, of course, does not obviate the approximations necessary for the other classes of property. In the light of these observations, it is evident that the present age of property cannot be determined precisely, even though it is an accomplished fact instead of future forecast; but that some estimating, averaging and approximating are required.

Estimation of Remaining Life

To be of tangible value, estimates of remaining life must be made by persons completely familiar with the operating characteristics and history of the particular plant, and such persons must be alert to developing and potential changes in the art and future factors which will affect remaining life. Such estimates require judgment which should weigh the following factors:

1. Past experience, including the study of past retirement experience as revealed in statistical or any other analyses available.
2. Changes in the causes of retirements.
3. Present conditions.
4. Operating and Maintenance policies.
5. Future load conditions.
6. Plans for future developments.
7. Developments in the art.
8. All other factors known to be in current operation and causing the property to depreciate.

The following is illustrative of the technique for determining the life characteristics of just one electric plant account, "Account 311—Structures & Improvements"—for a hypothetical company having two electric production plants, A and B, whose costs and composite age with respect to this one account are as follows:

	Original Cost	*Composite Age*
Plant A——	$ 370,500	39
Plant B——	8,562,167	16
Total Account 311....	$8,932,667	17

Upon reviewing the outlook for the future of these two plants, it is found that Plant A is inadequate to meet the load and that, due to the lack of cooling water, no additions can be made at this location. Plans call for retirement of this plant at the end of four years when a larger and more efficient plant will have been completed at a more suitable location. Accordingly, the remaining life of Account 311 with respect to this plant is obviously four years and the total life is therefore thirty-nine plus four, or forty-three years.

Plant B, however, is much larger and its capacity is capable of being enlarged as conditions warrant. Though it is sixteen years old, its efficiency has been greatly increased by revamping boiler facilities and by the installation of superposed units. No reason can now be seen as to why this station will not be in service for many years to come. However, it is realized that there is a limit, and accordingly a maximum of one hundred years is set as the life span of the building, even though it might be usable for power generation over a longer time.

Having examined the outlook for Plant B, we next consider the various physical items within this plant which make up the dollars reflected in Account 311. A summary of our general considerations is as follows:

The building structure is of first-class construction and with proper maintenance it should last at least one hundred years. However, its accounting must be shortened by adjustments for the life spans of those portions of the building written off because of equipment changes, and also for shorter lives of minor units of property within the structure such as roofing, plumbing, heating, stacks, etc.

The stacks have a gunite lining and, based on the experience of others, should be expected to last as long as the boilers (i.e. thirty-five years).

Wharf and Dock are built with piling cut-offs and timber platforms close to the low-water mark. The experience of others having wharves and docks of this construction on the same river supports the expectation of one hundred years of service.

With these and other detailed considerations in mind we should analyze Account 311 for Plan B by breaking down the account into the physical component parts such as structure itself, lighting equipment, heating equipment, ventilating equipment, plumbing and piping, elevators, roofing, stacks, wharves and docks, etc; listing the original cost of each component. We would list present age and estimate remaining life to obtain estimated service life for each component and then obtain a weighted average estimated life for the plant as a whole. This weighting is accomplished by dividing the cost of each item by its estimated service life and then totaling the results. This total is then divided into the total original cost to give the average weighted estimated service life.

Having thus developed the total estimated life with respect to Account 311 for Plant B, it becomes a simple matter to combine the estimates for Plants A and B so as to determine the estimated life for Account 311 in the aggregate as reflected on the books. This step is also done on a weighted basis:

	Original Cost	*Estimated Total Life*	*Cost Divided by Estimated Total Life*
Plant A—— ..	$ 370,500	43	$ 8,616
Plant B—— ..	8,562,167	72	118,544
Total for Account 311..	$8,932,667	70	$127,160

By repeating this process with respect to each account, a life estimate may be made for the entire plant.

There will be many people who will object to the introduction of so much judgment into the estimation of serv-

ice lives. They will say that our feet will no longer be on the firm ground of the facts of past and existing records. Defensibility will have been lost and one expert's opinion will be as good as another's. Where will we stand if we bring all this judgment before a commission or a court?

One answer is that service lives based on statistical studies of the past are not nearly so precise or factual as they seem. Past variations in accounting life practices, in the composition of individual accounts, and changes in the physical nature of property amply prove this to be so. Another is the fact that functional causes of depreciation, especially inadequacy and obsolescence, are predominant. Few will dispute the uncertainty of these causes for retirement, or insist that past history is a precise measure of their future impact.

It is certainly sounder and more realistic to stand behind estimated service life based on a careful study of past records plus the inclusion of judgment as to the future, than it is to insist that a service life estimate must be so because it is a mathematical product based on factual records. To use two homely examples:

Which is the more realistic, to say that the service life of your ten-year old manufactured gas plant is twenty-three years, because studies of the past indicate that to be so, or only thirteen years, because judgment brings into the estimate the fact that you will retire it in three years when cheap natural gas will be available?

Is it more precise to insist that the service life of your steam turbine is twenty-one years because of past experience, or forty-one years because judgment takes into account the addition of a superposed high-pressure, high-temperature unit which will extend its economic life?

PLANT B—ACCOUNT 311—STRUCTURES AND IMPROVEMENTS

Item	Description of Equipment	Original Cost	Estimated Life—Years: Present Age	Estimated Life—Years: Remaining Life	Estimated Life—Years: Total	Cost Divided by Est. Total Life
	(1)	(2)	(3)	(4)	(5)	(6)
1.	Power house struct. excl. of following items:	$6,172,167	16	84	100	$61,722
2.	Portion of building in which changes will be made in 18 yrs. for 12 new boilers (new blrs will occupy same space as present blrs)	250,000	16	18	34	7,353
3.	Portion of bldg in which changes for new unit will be made in 13 years	500,000	16	13	29	17,241
	Lighting					
4.	Boiler House	69,300	16	24	40	1,733
5.	Turbine Hse & Switchouse	87,300	16	34	50	1,746
	Heating					
6.	Piping & Radiation	46,600	16	34	50	932
7.	Equipment	5,500	16	14	30	183
	Ventilating					
8.	Ducts	2,100	16	84	100	21
9.	Equipment	2,700	16	14	30	90
	Plumbing					
10.	Cast Iron Pipe	39,600	16	84	100	396
11.	Other Pipe (steel pipe badly deteriorated due to water conditions—must be replaced by copper pipe in 10 yrs)	12,800	16	10	26	492
12.	Equipment & Fixtures	38,000	16	9	25	1,520
	Elevators					
13.	#1	22,500	16	34	50	450
14.	#2	28,000	5	45	50	560
15.	Roofing & Insulation	54,800	16	9	25	2,192
16.	Flashing & Sheet Metal Work	121,300	16	34	50	2,426
17.	Stacks	59,900	16	19	35	1,711
18.	Wharves & Docks	500,400	16	84	100	5,004
19.	Yard Improvements (Detail omitted here)	549,200	16	27	43	12,772
	Total Plant B Account 311	$8,562,167	16	56	(A)72	$118,544

Note A—Column 2 divided by Column 6

In the cases of items 2 and 3 we noted that the remaining life of these particular portions of the structures was definitely limited by the factors noted in Col. 1. The same is true of item 11.

In all the other cases our own experience plus that of others for comparable items plus consideration of physical and economic factors affecting the probable usefulness of the facilities causes us to believe that our originally estimated total life for these items is unchanged. We therefore insert these original estimates directly in Col. 5. Although not a part of the process of determining Col. 5 for these items, we also fill in Col. 4, in order to complete the table, by subtracting Col. 3 from Col. 5.

Periodic Revisions

The foregoing has been suggestive rather than definitive. There are no fixed rules for applying judgment since judgment, to quote Webster, "is a process of the mind involving comparison and discrimination, by which knowledge of values and relations is mentally formulated." To be of value, judgment must be systematically applied and it must be applied by persons familiar with the past history of the property, the present condition of the property, and the future plans for the property, as well as the probable economic effect of advances in the art.

Above all, an opinion resulting from the exercise of judgment cannot be static or fixed. As new evidence develops, the opinion should be revised in the light of the new evidence.

A.G.A.-E.E.I. Accounting Conference

(*Continued from page* 136)

a committee which has for two or three years been trying to bring about a higher degree of clarity and uniformity in the provisions of mortgage indentures which affect accounting transactions, to the effect that his committee members felt that they had gone as far as was practicable at the present time toward the accomplishment of their purpose and that further endeavor should be suspended. There was no dissent from this view but appreciation was expressed for the committee's devoted efforts.

Transmission and Distribution Committee Meeting

T. J. Brosnan, *Chairman*

THE forty-sixth meeting of the Transmission and Distribution Committee was held on May 3 and 4 at the Edgewater Beach Hotel in Chicago with 160 members and guests in attendance.

The Underground Group sponsored by J. A. Pulsford held a separate session on the morning of the first day followed by a joint session with the AEIC Cable Engineering Section in the afternoon.

E. F. Nuezel described changes in the recommended procedure for diagnosing cable, joint and termination failures and changes in the types of analyses included in the Cable Operations Report proposed by the joint AEIC-E.E.I. committee appointed for this purpose.

A. Bodicky presented a preliminary report on A-C Network Operations, 1944-1946, which showed that the peak load served by low-voltage A-C networks increased 42 per cent from 1943 to 1946. Almost 34 per cent of the companies now supply their network systems with a primary voltage in the 13-14-kv class. 120/208-v, 3-phase, 4-wire network systems, are still by far the most widely used although there is some increase in the use of 125/216-v systems. The failure rate of all secondary cable was 3.28 failures per 100 cable mile-years which is an increase of 60 per cent over the previous three-year period.

Standards for Underground Tranformers

Progress in the preparation of joint E.E.I.-NEMA standards for underground transformers was reported by M. W. Ghen. The first standard undertaken will cover conventional submersible-type transformers, 167 kva and smaller, single-phase, 225 kva and smaller, 3-phase; high-voltage 2400-15,000 v, low-voltage, 600 v and below.

T. H. Haines described experience with manhole explosions in Boston last winter. The extremely severe winter not only caused an unusual number of gas main breaks but the unusually heavy cover of snow also sealed the surface of streets to such an extent that leaking gas was forced to accumulate in the electric manholes. Conclusions were that manhole ventilation is an aid but not a solution to the problem. Close cooperation with gas utilities with prompt repair of leaks and frequent surveys for their detection is considered the most effective remedy.

A paper by T. L. Hall, describing an impulse-type cable fault locator used successfully by the Public Service Electric & Gas Co. was presented by A. S. Brookes. This device was described as comparable with the thyratron in performance but much smaller, more portable and less expensive.

The morning session closed with descriptions of standard network transformer manholes used in New York, Atlanta and Boston. Although individual designs varied to some extent, there was general agreement that manholes should be tailored if possible to the largest transformer to be used in them and should be cooled by natural ventilation with openings of 2 to 3½ sq ft per 100 kva.

Afternoon Joint Session

The afternoon joint session with the AEIC Cable Engineering Section opened with a description by F. E. Andrews of a buried cable system being tried on a large scale by the Public Service Co. of Northern Illinois. The system employs above ground transformers on pedestals. Connection to the overhead system is made with concentric oil base rubber neoprene buried primary cable. The buried secondary distribution cable is laid along the curb. Costs in excess of standard overhead construction are borne by the tract developer.

H. Halperin, Chairman of the AEIC Cable Engineering Section presided at a closed joint session for general discussion of problems experienced with the installation of high-voltage oil and gas pressure cable systems.

The Overhead Group sponsored by H. E. Stites also held a separate session on the morning of the first day.

Bryce Brady presented an economic study of secondary distribution systems in residential districts. With uniform loads of 5 to 30 kva per thousand ft and other premises applicable to the Oklahoma Gas & Electric Co. system, No. 0 bare all-aluminum conductor was found to be the most economical universal secondary conductor. No. 0 ACSR is a close second. All sizes of copper were shown to be more costly under present market conditions but among these No. 4 is the most economical. Banking of secondary mains is an economical means of limiting flicker voltage drop in the lower load density areas.

Results of an investigation of aluminum and aluminum to copper joints and clamps were described by G. B. Tebo of the Hydro-Electric Power Commission.

12-Kv Overhead Distribution Systems

During a general discussion of 12-kv overhead distribution systems, W. R. Bullard presented a paper by Chase Hutchinson describing the application of selective fuse-breaker coordination to this class of line. Since the 12-kv feeder can carry three times the load of a 4-kv feeder it is in general three times as extensive and the increased exposure causes faults to occur with greater frequency. Recognition of this limitation has led to application of selective fuse-breaker coordination on many Ebasco client company circuits. The scheme now has been applied to several hundred circuits and experience shows a substantial improvement in reliability and a corresponding reduction in operating costs. Details concerning successful application of the scheme gained from this experience were outlined.

R. I. Kauffman of the Asplundh Tree Expert Co. described experience with 2, 4-D in the treatment of rights-of-way. Tests with low-volume oil base sprays of about 6 gallons per acre have indicated faster and more effective results than high-volume water sprays. The low-volume spray also facilitates manual treatment of areas not suited to vehicles. It also has been found possible to kill all of the more resistant species such as briars, white oak and red maple provided proper concentrations are used.

Further experience with the use of helicopters for transmission line patrolling was reported by H. E. Stites. Trials by one middlewestern company indicate that helicopters appear to be practical only for emergency patrols

to locate damage immediately after an interruption. The expense of helicopters was not found to be justified for routine patrols and the detection of certain types of needed maintenance requires a climbing patrol. A three-month record of costs indicates an average of $70 to $75 per hour with an average coverage of 9 to 15 miles of line per hour.

General Engineering Group

The General Engineering Group sponsored by L. G. Smith held a separate session on the afternoon of the first day.

J. W. Anderson reported that the AIEE Electric Welding Committee has established a subcommittee to review the general question of power supply for resistance welders and prepare a report to supplement papers on this subject prepared by a similar subcommittee in 1940 and 1941. He also announced that the joint AEIC-EEI-NEMA report on single-phase motor starting current rules is about ready for publication.

Results of an investigation of voltage fluctuations caused by single-phase motor starting were outlined by L. M. Olmsted. The study indicates that to take care of even 1-hp single-phase motors it may prove necessary in many cases to move transformers closer to motor locations or to install additional transformers. Where larger single-phase motors must be served more extensive system alterations usually will be required. F. W. Nimmer emphasized that even the running current of the larger single-phase motors creates substantial voltage drops on the long rural circuits and suggested promotion of the use of smaller motors for certain farm jobs which can be performed just as conveniently over a long period of time as in a few minutes with the large motors which create voltage disturbances.

J. W. Anderson reported results of an investigation of the frequency of starting room air conditioners carried out at a number of representative residential installations in Philadelphia. There appears to be a significant correlation between frequency of starting and the sum of wet and dry bulb degree-hours. Starts of bedroom units are more evenly distributed over the day than those of living-room units which show a decided peak in the late afternoon. However, in total, less than 10 per cent of all starts occur in any one hour. In general, frequency of starting is low although automatic control causes a major increase in starts. Most units were started not more than three times per day, nor more than once per hour. A considerable increase in the use of room air conditioners is anticipated. Most of these units will be manually controlled and located in areas of light load density. Understandings already reached between the electric utility and the air conditioning industries should make it possible to supply adequate service for normal concentrations of these devices in the future.

Attention again was called to the need for development of a satisfactory means of re-energizing feeders which have been out of service for a sufficient time to cause all automatically controlled motor-driven devices to revert to starting positions so that the inrush current upon reclosure cannot be distinguished from a fault current. An increasing number of companies are experiencing this difficulty due to the recent rapid increase in the use of such devices.

A. B. Coyle of the Line Material Co. presented a model demonstration of carrier-current control equipment designed to handle six entirely different sets of loads individually. The 3,000-cycle transmitter may be used to control street lights, water heaters, sectionalizing switches, irrigation-pump motors and air conditioners simultaneously or it may be used to provide diversity among blocks of a particular load such as water heaters during peak-load periods.

The morning of the second day was devoted to a joint meeting with the Electrical Equipment Committee. A description of this session is included in the article on that committee elsewhere in this issue.

Standards and Specifications Group

A general session of the committee which followed in the afternoon opened with a summary of activities of the Standards and Specifications Group by its sponsor, F. W. Nimmer.

TD-17, "Specifications for Bolt Type Steel Insulator Pins with 1-inch Diameter Lead Threads" has been completed and is ready for release.

The first of the E.E.I.-NEMA specifications for individual types of wet-process porcelain insulators will cover suspension insulators. Specifications for switch and bus insulators will be next.

The specifications for Douglas Fir crossarms are nearing completion and soon will be sent to members for ballot. Good progress is also being made on a companion specification for Southern Pine crossarms.

The contemplated report recommending proper types of connectors and splices for particular applications and proper methods of installing them awaits accumulation of more information.

Continued progress is being made toward the standardization of distribution fuse links. The Joint E.E.I.-NEMA committee on this subject has been reactivated and results of studies carried on during the past year by the T & D subcommittee have been made available to the joint committee.

A very favorable response has been received on seven of the proposed E.E.I.-NEMA specifications for street lighting equipment recently submitted for final letter ballot.

B. J. Barmack reviewed the work leading up to the latest revision of the ASTM specifications for galvanized coatings on hardware. The problem of galvanized coatings is currently the subject of further investigation by the Chemistry Subcommittee of the Prime Movers Committee.

Distribution Transformer Report

The Fourth Report of the E.E.I.-NEMA Joint Committee on Standards for Distribution Transformers covering overhead transformers, single and three-phase, 500 kva and smaller; high-voltage 2400-15,000 v, low voltage, 600 v and below has been completed. The joint committee now will begin preparation of standards covering transformers 500 kva and smaller with primary voltages up to 69 kv and with secondary voltages above 600 v.

Current activities of the E.E.I.-Bell System Joint Subcommittee on Development and Research were reviewed by H. E. Kent. One project committee is preparing a new TIF weighting, a second plans to investigate the shielding characteristics of some of the newer types of telephone cable and a third recently has prepared a preliminary report on studies of methods to conserve pole space on rural joint use lines.

Electrical Equipment Committee Meeting

C. A. Corney, *Chairman*

THE Edgewater Beach Hotel, Chicago, Illinois, was the location of the forty-fifth meeting of the Electrical Equipment Committee on May 3-4, 1948, which was attended by over 70 members and guests.

At the closed session, where attendance is limited to members and invited guests, F. S. Brown presented a Summary of Apparatus Troubles reported to him for the period Aug. 15, 1947 to Feb. 15, 1948. There were 214 cases of trouble reported, of which 54 are classified as major. The average number of failures per month during this period was 36, compared to the 9½ year average of 22 per month. Forty-five cases of fires were reported, which was 17 more than the previous six-months period. Lightning accounted for 28 cases of trouble, which was 13½ per cent of the total. For the similar period in 1947 the percentage was 4 per cent. Of the troubles classified as major, transformers over 500 kva accounted for the most, with 8 cases; followed by capacitors with 7 cases, turbo-generators with 5 cases, and hydro-generators and induction regulators with 4 failures each.

An interesting and active discussion of apparatus troubles was held, during which several members presented detailed descriptions of specific troubles.

E. B. Shew reported on the results of a survey conducted by the AEIC Committee on Switching and Switchgear, relating to performance of metal-clad switchgear. The survey indicated that most cases of trouble experienced with this equipment occurred during installation.

Joint Session with Transmission and Distribution Committee

The joint session with the Transmission and Distribution Committee was high-lighted by a symposium on the interrelation between distribution system and substation design. E. W. Oesterreich gave the discussion from the distribution system point of view. E. B. Shew and W. M. Hanna covered the substation design phase of the discussion—Mr. Shew discussing utility designed substations, and Mr. Hanna discussing factory-built substations.

The three presentations indicated that the design objective common to both distribution system and substation engineers, is the development of the type of supply system which is the most economical on an annual cost basis over a long period of years for the specified types and rates of load growth during that period and which will provide:

1. Service voltage under normal operating conditions within the maximum and minimum limits required.
2. Service voltage under emergency operating conditions within usable limits as established by the characteristics of utilization equipment.
3. Adequate service reliability.

It was emphasized that the distribution system, substation and subtransmission system all need to be considered in arriving at the design objectives.

P. H. Chase, Chairman of the Engineering Division General Committee, briefly reviewed the activities of interest of his committee, and outlined the value of the engineering committee meetings to the companies and engineers participating. He pointed out the desirability of including younger engineers in the activities of the committees.

E. D. Glatzel presented a paper entitled "Communication, Telemetering and Control by Micro-Wave Radio." The Federal Communications Commission has made available, on a tentative basis, several blocks of frequencies from 900 megacycles upward for use by power utilities for communication, signalling, telemetering and control on a point-to-point basis. Mr. Glatzel pointed out that this type of circuit used to supplement wire or carrier circuits, would present a high degree of reliability. The costs of this equipment do not appear to be excessive, and several utilities are planning experimental installations this fall. He urged the members to consider this type of communication facility in their overall system planning. He mentioned that unless the channels tentatively set aside by the F.C.C. for utility use are utilized, these channels probably would be made available to other users.

General Session

C. B. Kelley gave a discussion of the United Light and Railways Company's interconnection in the states of Illinois, Iowa, Missouri and Kansas. He indicated that the interconnection will ultimately consist of 443 miles of 161-kv line and 51 miles of 69-kv line, with a total system generating capability of approximately 600 mw. The mileage of transmission line involved requires extensive communication control and signalling facilities. The single side-band type of carrier system was selected for this system. Single-pole tripping will be used at some points on the circuit and three-pole tripping at other locations. Load frequency control equipment will be installed at all major generating stations. Any station will be able to operate on flat frequency, flat tie-line, or tie-line bias control, although in so far as possible, tie-line bias control will be used.

Through arrangements made by C. F. Wagner, a slow-motion movie film of the Bonneville tests of the German "AEG" breaker was shown to the members.

"Selection and Training of Student Engineers" was the subject of a paper by E. H. Will. The many advantages of a proper training program for the student engineers as well as the Company were discussed and some recommended practices for inclusion with a training program outlined. It was indicated that greater interest is being shown by engineering graduates in utility employment now than in the past few years.

W. C. Bowen gave a progress report of the Storage Battery Group. The group held a meeting recently which was well attended and considerable discussion of various phases of operation and maintenance problems associated with control batteries took place. Meetings will be held at least once a year and reports and recommendations will be made to the full Committee as appropriate.

N. N. Smeloff gave a report entitled "Functional Development of 66-kv Switching and Transformer Stations of the Pennsylvania Power and Light

Company." The author indicated that the development of the Company's facilities is being carried out largely through the use of patterns established in previous years. Among these are patterns for various types of new substations to be used to meet load growths and the rehabilitation of old stations to meet required standards of service.

Standard system voltages of 220 kv, 66 kv, 12 kv, 4 kv and 120/208 v have been rigidly adhered to for the past 25 years, and studies indicate that these voltages are adequate to carry the various load developments for an indefinite period. Considerable emphasis is placed on correlation of reliability of various system components. As an illustration, Mr. Smeloff pointed out that a single transmission circuit of present-day design provides about the same reliability as other components entering into the power supply, whereas 25 years ago, two or more transmission circuits were required to provide adequate continuity of service.

"Job Training of Substation and Power Station Operators" was the subject of a paper prepared by J. W. Asmann. Three trained instructors supervise the job training of operators. A complete set of written instructions are utilized and written examinations are given at the end of each instruction period.

E. F. Dissmeyer gave the results of tests made on torque requirements of coal pulverizers. The tests indicated that in some cases the motor sizes should be increased to provide adequate starting and pull-out torques for the necessary range of conditions.

E. H. Snyder gave further information on the auxiliary power supply utilized with the new unit at the Essex Station. There was considerable discussion of the various methods of changeover from one auxiliary power supply source to another under both normal starting-up conditions and emergency conditions. The discussion indicated that there was considerable divergence of practice in this, and that for pulverized fuel plants the type of pulverizer was an important factor to be considered in selecting the method of changeover.

L. Birckhead summarized the results of questionnaires sent to committee members relating to use of hydrogen in excess of one-half pound for cooling of generators. The replies indicate that hydrogen pressure up to 15 lb is practicable and that generator capacity can be increased from 15 to 17 per cent at this pressure. No serious problems have been introduced by operation at the higher pressures. Mr. Birckhead also gave the results of his survey regarding standardization of 11,500-kw, 15,000-kw generators and suggested standard size above 60,000 kw. The survey indicated that hydrogen cooling is preferred for the 15,000-kw size. For the 11,500-kw unit, air cooling was considered to be adequate. No definite choice for the size of standard unit above 60,000 kw was indicated by the survey.

A. V. DeBeech reviewed developments of interest of the Foreign Practice Division. Interesting information on load shedding and carrier current relaying has been received from Great Britain. Canadian activities reported include the issuance of Canadian Standards Association Standards for Power Transformers (C88-1947). The Standard is similar to the ASA Standard except for regulating transformers impedance variations. The Canadian Standard specifies a limit of 5 per cent difference in impedance between regulating transformers of the same design compared to 15 per cent permitted in the American Standard.

Frequency of Starting Room Air Conditioners

(*Continued from page* 144)

tially consistent with the recent report of the joint AEIC-EEI-NEMA Committee on "Single-phase Motor Starting Currents."

Consequently, assuming full effect and cooperation of the membership of these industry associations, the room air conditioners on the future secondary should consist of both 115-volt and 230-volt motors and the capacity of the secondary should be adequate to take care of the 40 amperes locked rotor current of manually controlled 115-volt appliances. Under these conditions it is believed that — except where abnormal concentration of these devices occurs on a single secondary— adequate electric service can be rendered to users for all normal saturations that may be encountered for a long time to come.

Naturally, considerably more test data and experience are necessary to confirm this conclusion. It is hoped that other companies in various parts of the country will be sufficiently interested to go into this matter and the forthcoming air conditioning season offers an excellent opportunity to conduct the basic tests.

In summary:

1. Some correlation seems to exist between frequency of starting of room air conditioners and the sum of wet bulb and dry bulb degree-hours.
2. The starts of bed room units is more evenly distributed over the hours of the day than those of living room units, which seem to show a decided peak in late afternoon hours.
3. The hourly distribution of *all* starts over the day follows generally that of bed room units because of their greater number compared to living room units. In total, less than 10 per cent of all starts occur in any one hour.
4. In general, frequency of starting of room air conditioners is low. Most units start not more than three times per day and not more than once per hour.
5. Automatic control has a major effect in increasing frequency of starting.
6. For the future, the electric utility industry can look forward to a very considerable increase in the number of room air conditioners on their systems; these units will be mostly manually controlled and mostly located in areas of light load density.
7. It is believed that understandings already reached between the electric utility and the air conditioning industries make it possible to supply adequate electric service for normal concentrations of these devices to be expected in the future.
8. Considerable further test data and experience are needed to confirm the above conclusions. Wherever possible other utility companies should use forthcoming air conditioning season as an opportunity to secure basic information as to the use which owners of room coolers actually make of them.

PERSONALS

Horace P. Liversidge, chairman of the board of the Philadelphia Electric Co., has announced the election of K. M. IRWIN and H. N. RAMSEY as vice-presidents of that organization.

Mr. Irwin, named vice-president in charge of engineering, was graduated from the Yale-Sheffield Scientific School in 1915. After serving with the U. S. Navy during World War I he joined The United Gas Improvement Co. as a mechanical engineer. Transferred to the Philadelphia Electric Co. in 1931, he was subsequently appointed manager of Philadelphia Electric's engineering department. He held that position when elected to his present post.

During World War II he was executive director of the London staff, Public Utility Committee, of the Combined Production and Resources Board, and in this capacity made important contributions to the restoration of utility service in northwest Europe.

Active in the affairs of many important engineering associations and societies, he is a fellow of the American Society of Mechanical Engineers, and a member of the American Institute of Electrical Engineers, the Association of Edison Illuminating Companies, the Edison Electric Institute, the Pennsylvania Electric Association, and the Engineers Club of Philadelphia, of which he is past president.

Mr. Ramsey, elected vice-president in charge of purchases, insurance, and real estate, entered the utility business as an engineer with the American Gas Co. He later became assistant to the general superintendent of that company, and thereafter joined the engineering staff of The United Gas Improvement Co.

He was placed in charge of real estate operations of the United Engineers & Constructors, Inc., in 1931, and three years later became president of the Welsbach Co. He has been purchasing agent of the Philadelphia Electric Co. since 1941.

He attended Central High School in Philadelphia and was graduated from the University of Pennsylvania in 1920 as a mechanical engineer. He is a member of the Edison Electric Institute, the Pennsylvania Electric Association, the American Gas Association, the Pennsylvania Gas Association, the National Association of Purchasing Agents, and the Engineers Club of Philadelphia.

A series of promotions affecting division and district managerships of West Penn Power Co. have been announced by Vice President P. H. Powers.

D. H. JOHNSON, central division manager, with headquarters at Charleroi, will be retired at his own request, having reached retirement age. Mr. Johnson has given the company 42 years of continuous service, except for the period from September 1919 to May 1920. On returning to West Penn he was assigned the district superintendency at Butler. In June 1923 he was appointed manager of central division, and has served in that capacity ever since.

J. V. SOISSON, western division manager, with headquarters at Washington, will succeed Mr. Johnson, being promoted to the division managership of central division. A graduate of the University of Notre Dame with an Electrical Engineering degree, Mr. Soisson has been with West Penn since July 1926.

R. W. HURD, district manager at Charleroi, will be promoted to the position of western division manager. Mr. Hurd has been with the company since July 1927. He is a graduate Electrical Engineer from the Carnegie Institute of Technology.

A. R. NEWELL, now district manager at Ridgway, will become district manager at Charleroi. A graduate of the University of Pittsburgh's School of Business Administration, Mr. Newell has been employed by West Penn since October 1925.

Announcement of three promotions in the Hartford Electric Light Co. were made by Executive Vice President Kenneth P. Applegate.

STANLEY H. YOUNG, general foreman of the underground distribution system, was appointed company safety engineer. He succeeds JUSTIN H. AHRENS recently transferred to the sales department as industrial power consultant.

LEO H. GRISE, assistant general foreman, was appointed to succeed Mr. Young as general underground foreman, and JOSEPH L. WISSMAN, assistant distribution department engineer, was named assistant general underground foreman to succeed Mr. Grise.

Mr. Young is a native of Mapleton, New York, and a graduate of Rensselaer Polytechnic Institute in 1923 as electrical engineer. Prior to joining the Hartford Company in 1924, he served with the city engineering departments of Herkimer and Cortland, New York. He served in various capacities in the distribution department, advancing to assistant general foreman and general foreman of the underground system. He served in the Army in World War I. His home is in Wethersfield.

Mr. Grise was born in Holyoke, Mass., and is a graduate of Bliss School of Electrical Engineering. He served with the Turners Falls Power and Light Co. in its construction department and joined the Hartford Company in 1922. Before his transfer to the underground division of the distribution department, he served in the manufacturing division for several years as load dispatcher at South Meadow Station and night supervisor of the Pearl Street substation. His home is in Wethersfield.

Mr. Wissman, whose home is in Manchester, is a native of Parsons, Kansas, and was graduated from Kansas State College as electrical engineer. Before joining the electric company in 1946, he served for five years as engineer with the Cities Service Co. in Kansas. He saw service in World War II as a lieutenant in the U. S. Coast Guard, being instructor in electrical engineering.

At the organization meeting of the board of directors of Delaware Power & Light Co., two new positions were created.

HARVEY H. PLANK, formerly vice president and assistant general manager, was named vice president in charge of engineering and operations, and LLOYD R. LESLIE, formerly commercial sales manager, was named vice president in charge of sales and public relations.

Mr. Plank, a native of Watertown, N. Y. and a graduate of Clarkson College of Technology, came to Wilmington as assistant to the general

manager of the company in 1943, being subsequently elected vice president. Prior to his coming to Wilmington, he was associated for many years with the United Gas Improvement Co. in Philadelphia, having spent the entire period after his graduation, except for two years during World War I, in public utility work. Mr. Plank is an active member of the Kiwanis Club in Wilmington. In his new position he will be in general charge of engineering and planning as well as being in charge of the operations of the company's property.

Mr. Leslie is widely known throughout the Wilmington area. After spending several years in sales promotion work with the Philadelphia Electric Co. in West Chester and Ardmore, Pa., he came to Wilmington as sales manager of Delaware Power & Light Co. in 1929. Mr. Leslie is an active member of the Lions Club, the Advertising Club of Wilmington and the Wilmington Sales Executives Club.

Announcement was also made of FRANK P. HYER'S appointment to supervisor of operations, and THOMAS W. MCKENNA, formerly supervisor of industrial gas sales, who became commercial sales manager.

Collection Practices from the Standpoint of Cost

(*Continued from page* 148)

the change. We have endeavored to show that it is entirely feasible, provided that:

1. Adequate facilities are provided where customers may conveniently pay their current service bills.
2. An intelligent method is used to select delinquent accounts to be accorded collection action.
3. All credit and collection personnel, *particularly* field representatives, are adequately trained to carefully explain to customers the reasons why payment of delinquent accounts must be made to a company office, and to show them the advantages of paying future bills on time.

During all these years we have been rendering a door-to-door collection service to a small minority of our total customers. This costly operation is borne, to a great extent, by the large majority. The contribution of real dollar savings to the business is substantial; and we believe that any other utility can successfully adopt a similar policy if modified to suit local conditions.

CONVENTIONS AND MEETINGS

1948

JUNE

1-3 EDISON ELECTRIC INSTITUTE, Annual Convention, Atlantic City, N. J.

9-11 Northwest Electric Light and Power Association, Personnel Section and Accident Prevention Conference, Medford, Ore.

10-11 Pennsylvania Electric Association, Prime Movers Committee, Hotel Casey, Scranton, Pa.

14-15 Arkansas Utilities Association, Arlington Hotel, Hot Springs. Ark.

16-18 Pacific Coast Electrical Association, Inc., Hotel Fairmont, San Francisco, Cal.

16-19 Canadian Electrical Association, Annual Convention, Manoir Richelieu, Murray Bay, Quebec, Can.

21-25 American Institute of Electrical Engineers, Summer General Meeting, Mexico City, Mexico.

SEPTEMBER

20-21 Iowa Utilities Association, Fort Des Moines Hotel, Des Moines, Iowa.

20-24 Illuminating Engineering Society, National Technical Conference, Hotel Statler, Boston, Mass.

OCTOBER

4-8 American Gas Association, Auditorium, Atlantic City, N. J.

11-12 Prime Movers Committee, EEI, William Penn Hotel, Pittsburgh, Pa.

11-12 Transmission and Distribution Committee, EEI, New Ocean House, Swampscott, Mass.

14-15 Electrical Equipment Committee, EEI, William Penn Hotel, Pittsburgh, Pa.

18-22 36th National Safety Congress, Chicago, Ill.

NOVEMBER

8-13 National Electrical Manufacturers Association, Hotel Traymore, Atlantic City, N. J.

28-Dec. 3 American Society of Mechanical Engineers, Hotels Pennsylvania and New Yorker, New York, N. Y.

30-Dec. 3 National Electrical Contractors Association, Roney Plaza, Miami Beach, Fla.

DECEMBER

5-8 The American Society of Refrigerating Engineers, Washington, D. C.

JANUARY—1949

Jan. 31-Feb. 4 American Institute of Electrical Engineers, Hotel Pennsylvania, New York, N. Y.

EDISON ELECTRIC INSTITUTE OFFICERS AND COMMITTEES

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(Terms Expiring 1950)

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(Continued)

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